AIR CONDITIONING HEATING AND VENTILATING

APRIL, 1958—55th Year

Hospital Labs Require Special Ventilation According to Function
See page 59

Table of Contents Page 3

FOR OVER

82

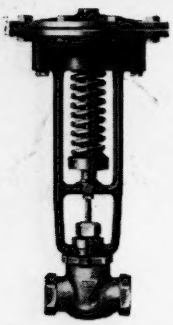
YEARS

engineers and research specialists at Watts Regulator Company have directed their knowledge and applied their skills to the regulation of pressure (Water, Steam, Air). Watts has been an outstanding producer of PRESSURE REGULATORS and PLUMBING and HEATING SAFETY VALVES and CONTROLS — a dependable source of finest quality products.

For full data on Watts products (the world's largest line of Plumbing and Heating Specialties) we invite correspondence.

PRESSURE REGULATORS for Commercial, Industrial, Institutional application . . .

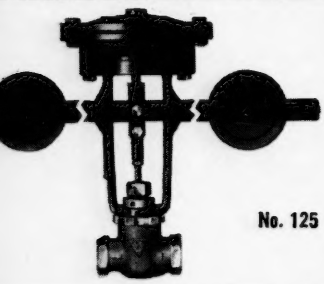
STEAM & AIR SERVICE



No. 127

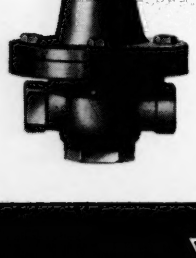
WATTS Nos. 127 and 125 Single Seated Pressure Regulators, Sizes ½" to 4". Initial Pressures up to 250 lbs.

No. 127 spring type — Reduced pressure range 10 to 100 lbs.



No. 125

No. 125 weight and lever type — Reduced pressure range 1 to 15 lbs.



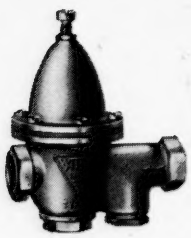
No. 152

WATTS No. 152 Self-Contained Single Seated Pressure Regulator, Sizes ½", ¾", 1".

Iron body construction with bronze trim for initial pressures up to 150 lbs. Reduced pressure ranges 5-40, 25-100 lbs.

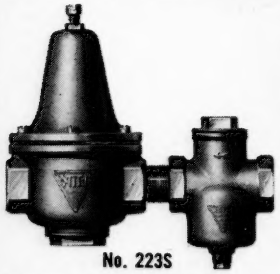
Bronze body construction for initial pressures up to 250 lbs. and reduced pressures up to 200 lbs.

WATER SERVICE



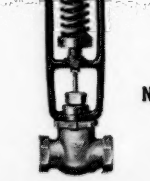
No. 135

WATTS No. 135 Self-Contained [illegible] ducing Valve. All bronze unit [illegible] corporating integral strainer. Si[illegible] ½" to 2". Initial pressures up [illegible] 250 lbs. Reduced pressure range [illegible] to 75 lbs.



No. 223S

WATTS No. 223 High Capac[illegible] Self-Contained Reducing Valve, Si[illegible] ½" to 2". Also furnished w[illegible] separate strainer, specify No. 22[illegible] Initial pressures up to 250 [illegible] Reduced pressure range 30 to 75 [illegible]



No. 127W

WATTS No. 127W Remote Conn[illegible] Diaphragm Spring Type Pressure R[illegible] ducing Valve, Sizes ½" to [illegible] Initial pressures up to 250 lbs. R[illegible] duced pressure ranges available fr[illegible] 10 lbs. to 100 lbs.

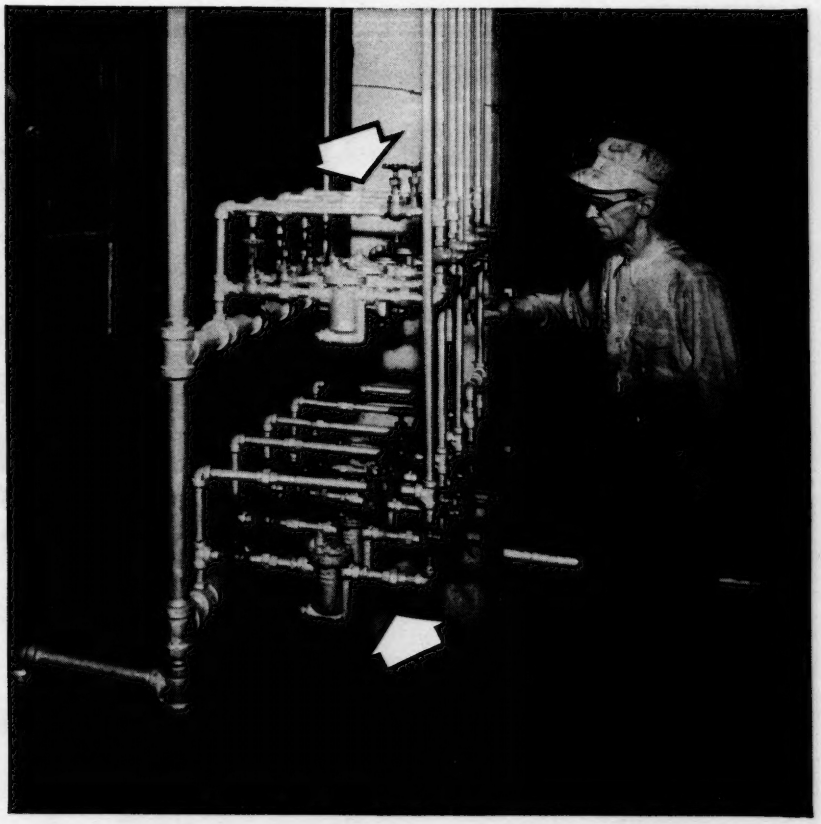
WATTS

WATTS REGULATOR COMPANY Lawrence, Massachusetts, U.S.A.

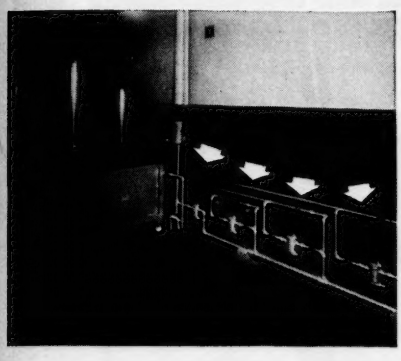
Send for Folder F-135A (Regulators for Water Service)

Folder F-127B (Regulators for Steam and Air Service)

Good Trapping Practice with Good Traps Roy Davis, Maintenance Superintendent, looks over one of the well-engineered Armstrong trap installations he has made at the Masonic Temple in Detroit. Traps discharge to 15" vacuum.



Keeping the Coffee Perkin' with Armstrong traps draining steam heated coffee urns.



Detroit's Masonic Temple Solves Vacuum Loss by Installing Armstrong Inverted Bucket Steam Traps

■ MANY AN engineering hour has been spent ferreting out the leaks in a vacuum return system. Here's a tip if you have the problem: *check your steam traps.* Don't worry about *flash* steam from traps—look for the traps that are leaking *live* steam. Take the case of the big Masonic Temple in Detroit:

The 11,600,000 cubic foot building has banquet space for 4500 persons at a sitting. Imagine the bedlam in the kitchen when the steam heated cooking equipment couldn't meet dinner schedules!—simply because condensate drainage was sluggish. The cooks were always in a stew and calls to the maintenance department were daily occurences.

The building buys 35 lb steam from Detroit Edison. Line pressure is used for the cooking kettles, while regulating stations supply 2 to 3 lb steam for the heating system.

Couldn't Hold Vacuum

Prior to the installation of Armstrong traps, maximum vacuum attainable was 4 inches and in some cases it was necessary to manually drain the systems and dump the condensate.

According to Roy Davis, Maintenance Superintendent, the installation throughout of Armstrong inverted bucket steam traps has solved the problem. "*I don't remember having had the chefs complain since . . . the kettles heat in a hurry now.*"

F. W. Emblin, Operations Manager, adds, "*You can check the vacuum gage any time now and seldom find less than 15" showing.*"

There's another nice part to this story that only time will reveal: Armstrong traps have a habit of delivering this kind of service on low pressure vacuum return systems for years and years without repairs. Your local Armstrong Representative has plenty of cases he can tell you about. Why not call him today?

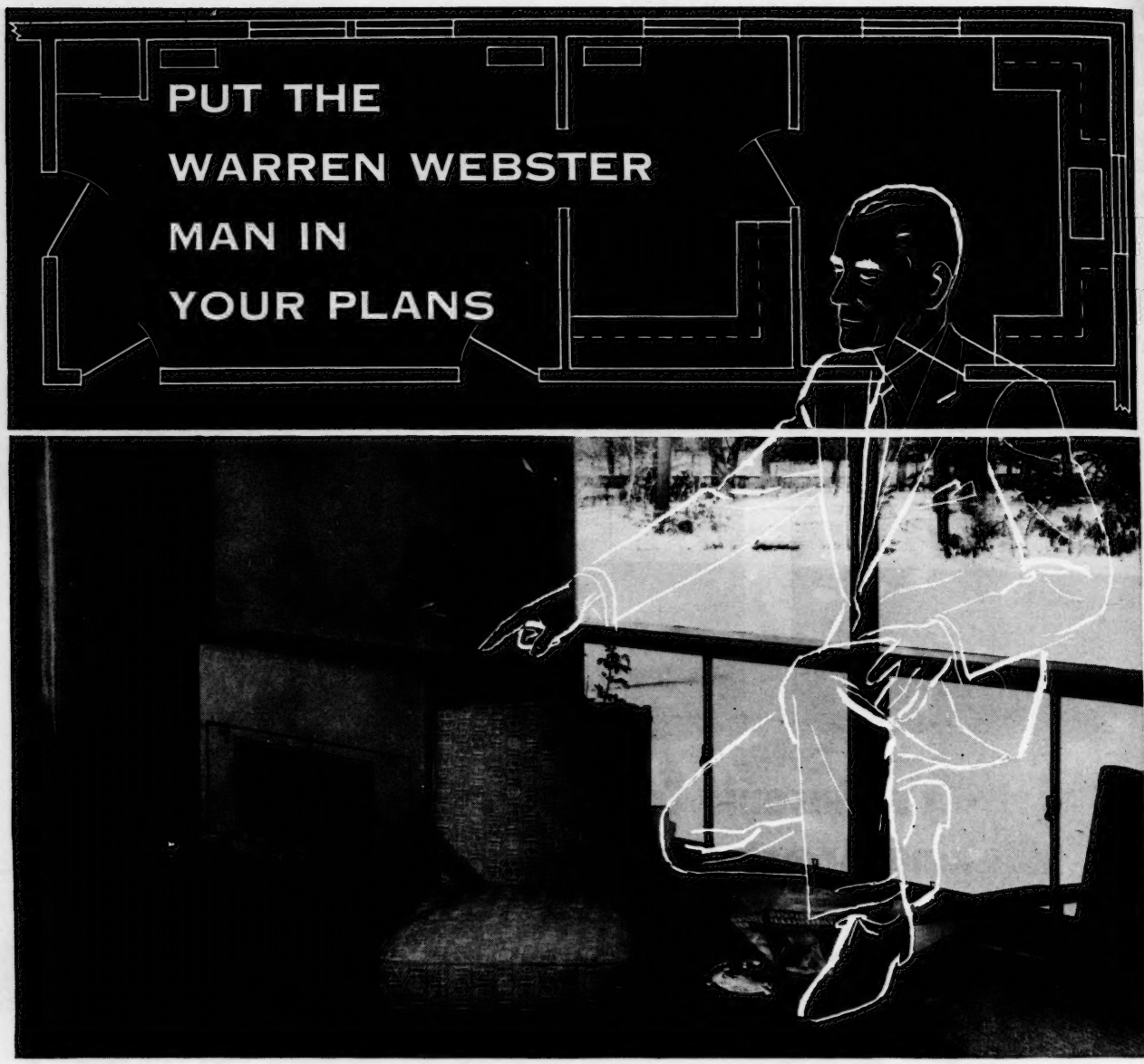
ARMSTRONG MACHINE WORKS
Maple Street • Three Rivers, Michigan

FACT-FULL LITERATURE FOR YOU

FREE: 44-Page Steam Trap Book plus two reprints explaining facts about trap operation on vacuum return service.

ARMSTRONG MACHINE WORKS
8464 Maple Street, Three Rivers, Michigan
Please send Steam Trap Book, "Flash at Traps" and "Vacuum Isn't Vacuum."

Name_____
Company_____
Street Address_____
City_____ Zone___ State_____



Now You Can Have Newport Comfort... Winter or Summer

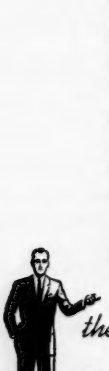
It's winter outside . . . but the handsomely-styled Webster Newport Air Conditioner isn't idle. It's working quietly, efficiently, to provide comfortable, even heat in this doctor's reception room.

The new through-the-wall Webster Newport Conditioner offers complete flexibility — air conditioning in the summer, plus the winter-long comfort of modern central-system HYDRONICS heating, using hot water or steam.

What's more, here's complete thermostatic control, winter and summer, at each unit . . . and no window obstruction. All this for less than a central chilled water system . . . less than an air system using ducts. In three capacities, same-size cabinet. Units for cooling only, if desired.

Talk it over with your Warren Webster Man. Or write us for Bulletin B-2020. Warren Webster & Company, Camden 5, New Jersey. Since 1888. Offices in principal U.S. cities and Canada.

WEBSTER'S
FINEST
PRODUCT



the Warren Webster Man

WARREN WEBSTER

HEATING . . . COOLING

AIR CONDITIONING HEATING AND VENTILATING

Volume 55, Number 4 **April, 1958**

THE COVER

Ventilation requirements of hospital labs vary, and lab function (radio-isotopes, pathology) indicates treatment. Photo, A. F. Sozio from Gendreau.

HOSPITALS

Heating and Ventilating Design for Hospitals **59**
Basic design data and guidance .....J. E. York

AIR MOVING

Applying Mixed-flow Units in Commercial Systems **64**
Data for use in design problems .....A. A. Atalla

COMBUSTION

Design Criteria for Stacks and Breechings **68**
Aids toward achieving stable flue-gas flow.

PIPING SYSTEMS

Data Sheet—Identification of Piping Systems **73**
Legend and color standards promote positive identification.

DUAL DUCT SYSTEMS

Reference Section—High Velocity Dual Duct Systems **75**
Problems associated with design and installation.....N. S. Shataloff

PIPING

Detail Sheet—Piping Hookups **87**
Piping for thermometers; piping for air compressor.

COMPRESSOR PROTECTION

Designing Out the Kinks in Refrigeration Systems—Part 2 ..... **89**
Suggestions for correction or elimination .....M. A. Ramsey

FOREIGN RESEARCH

Europeans Cooperate on Heating and Ventilation Research..... **93**
A report on an unusual international group.

COOLING TOWERS

How the Labs Fight Rot **94**
Improved laboratory methods can save the wood.....M. M. Fetkovich

SOLAR ENERGY

Vast Antarctic Solar Resources Go to Waste **95**
Reflective ice insulation keeps South Pole freezing.

DEPARTMENTS

High Spots in the News **4**
Washington Overtones—L. Overman **6**
Briefly Stated News Items .. **10**
Scientific Frontiers **14**
What Readers Say **63**
Picture Paragraphs **86**
Piping and Plumbing—L. Blendermann **96**
News of the Month **100**
News of Equipment and Materials **101**
Degree-Days for Feb., 1958.. **124**
New Catalogs **128**
Canadian Degree-Days for Jan. 1958 ..... **148**
Coming Events **150**
Ad-Digest **163**

EDITORIAL STAFF

EDITOR
Clifford Strock

ASSOCIATE EDITORS
Nathan N. Wolpert
William B. Foxhall
Harold M. Englund
Richard L. Koral

ADVERTISING REPRESENTATIVES

NEW YORK 13
Harry J. Twine
93 Worth Street
George W. Miller
93 Worth Street

CLEVELAND 12
Edward B. McEntee
17115 Hillsboro Rd.

CHICAGO 1
George G. Turner
228 N. LaSalle St.

BIRMINGHAM 9
Fred W. Smith
1201 Forest View Lane

DALLAS 18
Richard B. Hoierman
9006 Capri Drive

LOS ANGELES 57
Robert H. Deibler
1800 W. Sixth St.

EXECUTIVE OFFICERS

PRESIDENT
Robert B. Luchars

VICE PRESIDENT-TREASURER
Edgar A. Becker

SECRETARY-PUBLISHING MGR.
Harold L. Gray

AIR CONDITIONING, HEATING AND VENTILATING is published monthly by The Industrial Press, 93 Worth Street, New York 13, N. Y. Executive, editorial and subscription offices, 93 Worth Street, New York 13, N. Y. • Entered as second-class matter August 31, 1956 at the Post Office, East Stroudsburg, Pa., under Act of March 3, 1879. • Subscription rates: In the United States and Canada, one year, $3; two years, $5; in all other countries, one year, $7; two years, $11. Single copies, 30c.

• Copyright 1958, by The Industrial Press. Permission required to reproduce articles.

• Contents of AIR CONDITIONING, HEATING AND VENTILATING are indexed monthly by Industrial Arts Index and microfilmed by University Microfilms, Ann Arbor, Mich. • Member: National Business Publications, Business Publications Audit of Circulation, Inc., Society of Business Magazine Editors.

HIGH SPOTS

• The 54th Annual Meeting of **The American Society of Refrigerating Engineers** and the Semiannual Meeting of the **American Society of Heating and Air-Conditioning Engineers** will both be held in Minneapolis, June 23-25. There will be separate technical sessions and forums, but **several joint conferences and social events.** ASRE headquarters will be the Leamington Hotel; ASHAE will be headquartered at the Nicollet Hotel. Joint conferences will discuss air conditioning, insulation, education, and condensing methods. Each society will have its own Welcome Luncheon but a dinner-dance on the following day will be a joint affair.

• The second annual board of directors meeting of the **Consulting Engineers Council,** national organization of consulting engineers, will be held in San Francisco May 1-3. Nineteen delegates representing over a thousand members will be present. This compares to ten delegates representing less than 500 members who met in 1956 in Tulsa. Principal items of business will include **election of officers,** acceptance of a **new set of by-laws,** and establishment of the **1958-59 budget.** Affiliation of at least one, and possibly more, new member associations is expected. Reports are planned from a number of committees, including: corporate practice, fees and contracts, C.E.C.-Producers Council, Federal aid highway, and office practice. Subjects for consideration on the national level include: liaison in Washington, Wage-Hour Law, contracts providing engineering services, legislation permitting electrical contractors to design plans, registration of consulting engineers, and others. The Consulting Engineers Association of California will act as host. Site for the meeting will be the Sir Francis Drake Hotel.

• An extensive market potential exists in the field of **space and process heating for atomic energy,** Charles M. Rice, manager of reactor engineering department, American Radiator and Standard Sanitary Corporation, stated at the Atomic Energy Management Conference, Chicago, Ill. Mr. Rice asserted that potential applications extended to district, military, and institutional space heating, and to combination plants for developing power or low-pressure steam for various purposes, including industrial usage. He discussed a boiling water design with aluminum fuel elements that operates at 450 deg F to produce water or steam at 400 deg. Such a reactor could be in operation by 1960, he said, with unit cost of steam competitive in many parts of the United States.

• Perfection of a process for producing **tubular shapes within sheet and plate aluminum** is announced by Aluminum Company of America. The product is described as a one-piece unit of aluminum sheet or plate that contains a series of lengthwise, parallel areas that can be expanded with air or fluid to form integral tubing. The company states that the new product will be useful in solving heating or cooling problems in the fields of refrigeration, transportation, residential heating, process applications, and air conditioning.

• **The World Assembly of Engineers and Architects,** Friends of Israel, will be held from May 29 to June 9, sponsored by the Association of Engineers and Architects of Israel and endorsed by Technion-Israel Institute of Technology. Central theme of the assembly, which is expected to draw engineers and architects from all parts of the world, is the role of technology in the development of Israel, which will be celebrating its tenth anniversary. Among the engineers who will address the various sessions, to be held in Haifa, Tel Aviv, and Jerusalem, are Philip Sporn, president, American Gas and Electric Company; Louis Kahn, professor of architecture, Yale University; and William Ginsberg, consulting engineer.

compact, efficient,
mass produced for
quick delivery

a new P-K product line you'll want to know about— and the new P-K catalog that describes it

—YOURS FOR THE ASKING!

The P-K Type DW convertor and water heater is for use below the water line of steam or hot water boilers. It is engineered for high heat transfer and low maintenance and the design is standardized for a complete selection of sizes – capacities – temperature ranges – for industrial and domestic "water to water" heat applications.

Mail the coupon now for complete description, including capacity and dimensional tables of sizes available for fast delivery. The Patterson-Kelley Co., Inc., 1104 Warren St., East Stroudsburg, Penna.

Patterson-Kelley Co., Inc.
1104 Warren St., East Stroudsburg, Penna.
Send me a copy of Bulletin No. 6050 on the new P-K Type DW convertor and water heater.

*Name*_____ *Title*_____

*Company*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

Patterson Kelley
Water Heater Division
Storage Water Heaters • Instantaneous Heaters Convertors • Fuel Oil Heaters

WASHINGTON OVERTONES

by LORING F. OVERMAN

● The current recession—its existence finally conceded by both political parties—sounds the keynote for countless overtones which seek to turn the economy charts upward.

Exponents of tax cuts point out that recoveries in 1949 and 1954 were speeded by reductions in levies.

Pump-priming enthusiasts consider the faltering economy ample excuse for increased Federal spending.

A third group—a shrinking minority—considers the slump a somewhat-normal happenstance which will right itself in the not-too-distant future.

Indications are that both the tax-cutters and the pump-primers will have their way, in part. Either method should find the air conditioning, heating and ventilating industries favorably affected. All would welcome a tax-cut; pump-priming would necessarily include aid to construction.

● Tax-cutting offers the most popular approach to the problem, because of its universal appeal to both recipients and political parties. No less than 20 different plans are under consideration. So Washington observers point out that "now is the time for all good men to come to the aid of their preferred tax cut."

What they mean is that pressure groups are bombarding Capitol Hill, and that the "wheel that squeaks the loudest" (votewise) stands to win the biggest concessions when levy-trimming time begins.

Favored by rank and file is a proposal to increase personal exemptions by $100 from the present $600 level on individual income tax returns. This proposal is usually resisted because it would remove millions of taxpayers from the tax rolls.

Business generally is supporting the Sadlak-Herlong plan of reducing individual and corporate tax rates in five annual steps, to a maximum of 42% for top bracket individual and business taxpayers. There would be corresponding reductions in the lower brackets. Over the five years, a minimum reduction of 25% would be provided for all taxpayers.

Business and many individuals like the Sadlak-Herlong plan because it represents long-range tax reform, rather than merely short-range release of funds for consumer spending as a recession stop-gap measure. The plan includes built-in provisions for postponing an annual reduction if Congress should consider such a step advisable.

Another tax revision proposed as a recession-alleviant would put money into circulation immediately by a moratorium on income tax withholdings for the balance of 1958. Working this idea into the Sadlak-Herlong bill might combine the advantages of both measures.

Proposed excise tax cuts are also being favored by business as a sales stimulant. Some would remove levies from room air conditioners and some plumbing and heating equipment.

● Recalling that only weeks ago the idea of a tax cut was considered fantastically impossible, some Washington observers are pointing out that the recession might be "worth its weight in gold" if it results in overdue tax reforms. Such reforms, they contend, would ease the recession by restoring both individual income and business confidence.

In the weeks immediately ahead, members of Congress will be anxious to learn of constituents' viewpoints.

● Pump-priming, the reverse side of the recession-aid coin, is playing a poor second to tax-cut movements. There are two negatives to the pump-prime plan:

—First, priming implies deficit spending, future tax increases.

—Secondly, priming takes effect slowly; funds made available tomorrow might not reach the cash registers for many months.

(Continued on page 8)

ONE MILLION DOLLARS OUT THE WINDOW

BY THE WRONG ANSWER TO ONE BUILDING QUESTION*

Do you know the answers to these important problems?

1. **Is it true that WHITE PAINT indoors, and MIRRORS, have no more reflectivity to heat rays than a heavy coating of BLACK PAINT?** (20, 22)
2. **What causes timber rot, peeling paint, wet and cracked plaster, rust?** (16, 35)
3. **Is it true the average family creates 152 lbs. vapor (76 qts. water) a week; each person breathes and perspires 3 lbs. vapor per day?** (16, 35)
4. **Should you ever ventilate below insulation?** (11)
5. **How good an insulation is an ordinary air space?** (18, 25, 26, 27, 29)
6. **Is it true that HEAT RAYS HAVE NO TEMPERATURE?** (19, 21)
7. **Do metals in air spaces absorb, reflect and emit less or more heat rays than wood, plaster, brick, paper?** (20, 22)
8. **Which has the greatest and which has the least heat ray absorptivity:—asbestos, ice, aluminum, paper, rock or wood?** (22)
9. **Are there more invisible rays than visible rays?** (18, 19)
10. **Are there any DEAD AIR CELLS in insulations with respect to heat flow?** (28)
11. **Since metals are good conductors of heat, why are they exceptional insulators against heat flow?** (18, 20)

* The question was which type insulation to install inside the brick walls of a large housing development. "The Wrong Answer" made it necessary to rip open the plaster walls to remove sopping wet insulation at a cost of more than a million dollars. It was replaced with aluminum.

You'll find the answers in "Heat Flow by Radiation in Buildings—Simplified Physics," 3rd edition, written by an authority on heat and vapor flow, Alexander Schwartz. Facts, theories, practical installation techniques, scientific reports and discussions, aided by generous illustrating, are included in its contents. This booklet is helpful to architect, engineer and builder alike.

The numbers above refer to pages in the booklet whose text gives you the answers. Get the booklet, and this important information. Mail the coupon for your free copy.

Infra Insulation, Inc., 525 B'way, N.Y.C., Dept. V-4

☐ Send "Heat Flow by Radiation in Buildings."

Firm_____

Name_____

Address_____

Kind of Business_____

WASHINGTON OVERTONES *(Continued from page 6)*

Consequently, Washington hesitates to concede that the recession might be of such extended duration as to require long-deferred action. Nevertheless, several projects are under consideration, some of them directly affecting the fields of air conditioning, heating and ventilating.

● First anti-recession measure passed by the Senate (and awaiting House action at this writing) was an emergency housing bill expected to create 600,000 jobs. The measure:

—extends veterans' housing program for two years.

—lifts legal maximum rate on veterans' loans by ¼% to 4¾%; by ½% to 4½% on military housing mortgages.

—creates new special assistance category within Federal National Mortgage Association with revolving fund of $1-billion for purchases at par of mortgages up to $13,500 in principal and backed by FHA or VA.

—increases to $950-million from $450-million the FNMA special assistance fund available to purchase mortgages not otherwise marketable.

—provides additional $300-million for direct housing loans to veterans.

—reduces required down payments on FHA-approved loans to 3% for first $13,500; upper limits to remain unchanged at 15% for amounts from $13,500 to $16,000; 30% from $16,000 to $20,000.

● Pump-primers have been wondering whether the Department of Defense might aid the recession by finalizing contracts for which funds have been appropriated but not apportioned. Services reported some $2¼-billion available, but explained that long lead-times would delay actual payment of funds into business channels until late 1958 or early next year.

"Action now," they reported, "would not increase expenditures in fiscal 1958, but would increase the industrial backlog of unfilled orders."

● Other pump-priming projects under consideration:

—speedup on civil and public works.

—speedup on highway construction programs.

—continuance of farm price supports at levels above those recommended by the Administration.

—reclamation projects to cost hundreds of millions.

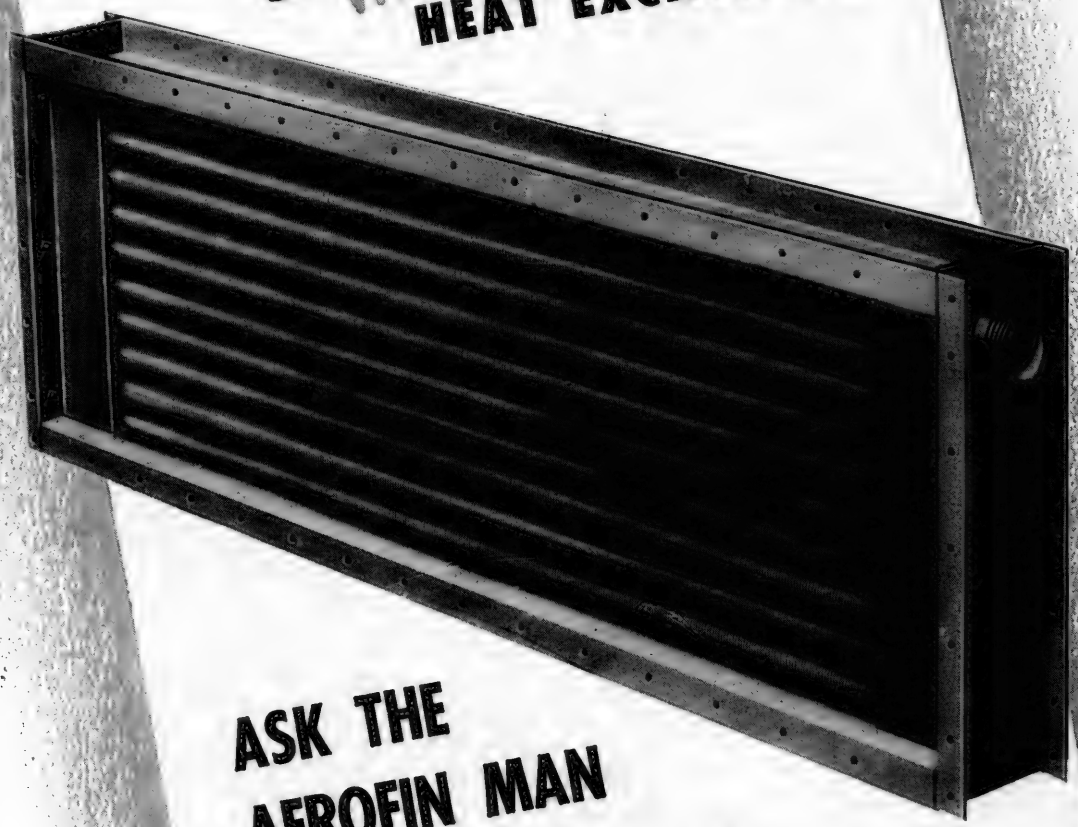
● To encourage business to construct defense plants under speed-up programs the Office of Defense Mobilization is again issuing certificates of necessity permitting rapid amortization (for tax purposes) of new plants required for defense.

● Air conditioning, heating and ventilating firms interested in defense contracts may find helpful some new regulations concerning small business set-asides. Proposed revision would affect Section 1706.6 of the Armed Services Procurement Regulation.

● Bureau of Mines has issued a technical report of analyses of 492 samples of crude petroleum from 470 oilfields in 20 states. Copies are available only through Superintendent of Documents, Government Printing Office, Washington 25, D.C. ($1.25 each).

● Coal and Oil producers have joined in testimony before House Ways and Means Committee to ask strict curbs on petroleum imports. Excessive importation of crude petroleum and petroleum products "constitutes a serious threat to our nation's security", the committee was told by Robert L. Wood, board chairman, Independent Petroleum Producers Association. National Coal Association, represented by Dr. C. J. Potter, urged Congress to prohibit excessive imports of residual fuel oil and crude oils to relieve both coal and railroad industries.

*FIRST LINE *Extended-Surface* HEAT EXCHANGERS



ASK THE AEROFIN MAN

Specify Aerofin and you specify high efficiency, long service life and low maintenance and service costs.

Take advantage of Aerofin's unequalled experience, production facilities, and materials-testing and design research—of Aerofin's complete engineering service at the plant and in the field.

Ask the Aerofin man.

*Aerofin makes extended heat surface exclusively — not as a by-product, not as a side-line. Sold only by manufacturers of fan-system apparatus. List on request.

AEROFIN CORPORATION
101 Greenway Ave., Syracuse 3, N. Y.

BRIEFLY STATED

• The partnership of Rebmann & Gay is expanded into the partnership of REBMANN GAY HEROLD, CONSULTING ENGINEERS, 1502 St. Louis Ave., St. Louis 6, Mo. Quarters are improved and a larger staff is at work on all types of consulting work for owners and architects covering all phases of mechanical and electrical engineering. Charles P. Rebmann has had 33 years of engineering experience in the St. Louis area, the last three as principal of the firm. Clarence E. Gay, Jr., has had 17 years of experience, the last three as principal of the firm. George F. Herold, has had 30 years of experience, the last 12 in the consulting field in St. Louis. All the members of the firm are registered professional engineers.

FOR THE FILES—John G. Skidmore, of GUSSOW AND SKIDMORE, ELECTRICAL AND MECHANICAL ENGINEERS, announces the removal of the firm's offices to 160 East 56th Street, New York City 22 . . . The executive offices of WALWORTH COMPANY are at new and larger quarters at 750 Third Avenue, New York City 17 . . . The Cleveland, Ohio, district sales office of THE BABCOCK & WILCOX COMPANY'S Boiler Division is moved to 55 Public Square, Cleveland 13 . . . WATER SERVICE LABORATORIES, INC., has moved its Philadelphia offices and laboratory to 169 West Wyoming Avenue and a new branch office has been opened in Richmond Va. . . .

Cleveland Fuel Equipment Co., Cleveland, Ohio, has changed its name to CLEVELAND CONTROLS, INC., a name said to be more descriptive of the character of its new products and plans. The company is expanding into the field of electric and electronic controls in the power, heat, and process fields, as well as expanding its line of products in the heating, ventilating and air-conditioning fields.

WITH THE INSTITUTES AND ASSOCIATIONS—Monthly meetings of the PACKAGED FIRETUBE BRANCH, AMERICAN BOILER AND AFFILIATED INDUSTRIES, are held at 15 Park Row, New York City. This branch consists of manufacturers of firetube boilers who have incorporated the boiler and all components, including burners and controls, into a self-contained assembly. The organization is instrumental in strengthening national and state boiler codes. In addition, many branches of the government are aided by this group in establishing uniform specifications and ratings as they apply to government or military projects. A public relations committee, consisting of three of the eleven manufacturer members, has been established . . .

A HEAVY-DUTY FORCED AIR HEATER DIVISION of GAS APPLIANCE MANUFACTURERS ASSOCIATION (GAMA) is in the process of organization. Its slate of officers is headed by Walter L. Davidson of Dravo Corporation. The decision to organize a division for manufacturers who produce a heavy-duty forced air gas heater capable of producing in excess of 500,000 Btu per hr output was made at a meeting in Pittsburgh under the chairmanship of Robin A. Bell of Surface Combustion Corp.'s Janitrol Division. Named vice-chairman of the group is M. Everett Barnard, Unit Heater Div., Carrier Corporation. David R. Webster, Reznor Manufacturing Co., is named to the executive committee . . .

Standards for thermal design of high temperature water heat exchangers were under study at the technical session of FUEL OIL AND WATER HEATER MANUFACTURERS ASSN. at its annual meeting in New York. Newly-elected president of the group is C. E. Drake, chief engineer, Heat Exchanger Div., Patterson-Kelley Co., Inc. J. S. Lough, Richmond Engineering Company, is the secretary. . . . Natural Gas Fuel Utilization will be offered this summer along with four other courses on natural gas, it was announced by the INSTITUTE OF GAS TECHNOLOGY, Illinois Institute of Technology, Chicago. Instruction is at the college senior level. Requests for information should be directed to: Chairman, Education Program, Institute of Gas Technology, Technology Center, Chicago 16.

BURGEONING BUSINESS—Company sales representatives from the United States and Canada inspected the new plant facilities of KENCO PUMP DIV., AMERICAN CRUCIBLE PRODUCTS CO., Lorain, Ohio, while attending a national sales convention. New assembly and improved production procedures were explained to the men . . . Two weeks and three days after an early morning fire destroyed AMERICAN AIR FILTER COMPANY'S Plant 2, the firm shipped its first orders from a relocated site, formerly occupied by Reynolds Metals Company and Graco Enterprises, in Louisville . . . Operation has commenced at a new manufacturing plant of THE TRANE COMPANY in La Crosse, Wis., where heat exchangers are being produced, including units for heat dissipation in guided missiles and jet aircraft . . . DRAVO CORPORATION has purchased the shops and land of Pittsburgh Screw and Bolt Corporation's Graham Works on Neville Island, Pittsburgh. The new facilities, including 40 acres and 260,000 sq ft of shop floor space, will help in the consolidation of certain of the company's operations.

NEW SHOOTS—CLIMATE CONTROL, INC., Decatur, Ga., is appointed an authorized source for TRANE package air conditioning equipment . . . Three agencies in the midwest to represent WING MANUFACTURING COMPANY are announced. They are: BOSEY & FREW, INC., Indianapolis, Ind.; SERVICE REFRACTORIES, INC., Peoria, Ill.; and P. R. DEANE CO., Geneseo, Ill. . . . UNIVERSITY SHEET METAL WORKS, Seattle, Wash., is appointed a distributor for WESTINGHOUSE heating and air conditioning equipment: oil and gas-fired furnaces, Precipitrons, and packaged residential and commercial air conditioning units . . . MUSSUN EQUIPMENT CO., Cleveland, Ohio, as representative for dual-duct air mixing equipment is announced by BUENSOD-STACEY, INC.

• Herbert E. Barth, executive vice-president, AMERICAN BLOWER DIV., AMERICAN-STANDARD, has retired after 43 years of service. He began his career with the division in 1915 as a graduate student engineer. He has been a prominent figure in the activities of Air Moving and Conditioning Association, Inc.

(Concluded on page 12)

Now

ANEMOSTAT®

presents

Standardized Constant Volume

TURBULATORS

The Anemostat Constant Volume Turbulator is a standardized high capacity dual duct unit handling from 800 to 7000 CFM. It provides an economical solution to many air distribution problems in which a large volume of air at controlled volume or pressure, and temperature, is involved.

With the Anemostat system, all thermal functions—heating—cooling—ventilating—are accomplished with air. Coils and resultant coil lag are eliminated together with required piping. Pressure losses are low and so are noise levels. Quality-built Anemostat Turbulators function automatically. They are easy to install, simple to maintain.

Anemostat Constant Volume Turbulators provide zoning up to 7000 CFM with one set of controls—save money by replacing coil reheat zone-control with all-air system.

New Bulletin gives important engineering data on Anemostat Constant Volume Turbulators. Write for your copy today.

ANEMOSTAT®

DRAFTLESS *Aspirating* **AIR DIFFUSERS**

ANEMOSTAT CORPORATION OF AMERICA

10 EAST 39th STREET, NEW YORK 16, N. Y.

REPRESENTATIVES IN PRINCIPAL CITIES

BRIEFLY STATED

(Concluded from page 10)

AMONG THE MANUFACTURERS' PERSONNEL—Ralph A. Gonzalez, director of technical services, AIRTEMP DIV., CHRYSLER CORP., Dayton, Ohio, has received a certificate of appreciation for his public service as advisor to FHA during 1957. The Federal Housing Administration certificate praises his help in the development of housing programs to improve living conditions in the United States . . . Thomas H. Pike, Jr., is appointed division vice-president of TUBE TURNS, Louisville, Ky., division of NATIONAL CYLINDER GAS COMPANY, Chicago. He will be in charge of planning . . . John E. Craig is the new manager of packaged air conditioning sales, NATIONAL-U. S. RADIATOR CO., Johnstown, Pa. . . . Formerly New York sales manager for EMBASSY STEEL PRODUCTS, INC., Irwin B. Nelson is now vice-president, national sales and a member of the board of directors of the Brooklyn concern . . .

E. F. Greiwe succeeds M. L. Murdock, who resigned, as manager of the NORWOOD WORKS centrifugal pump department, ALLIS-CHALMERS MFG. CO., Milwaukee, Wis. . . . With headquarters in Chicago, George Steiner, new regional manager, WESTINGHOUSE CORPORATION'S STURTEVANT DIVISION, will supervise and direct all field personnel and sales activity in the firm's midwestern region . . . Succeeding T. P. (Phil) Coine, who retires after 35 years with the company, Edward J. Udick will manage the Sheet Mill Department of WEIRTON STEEL COMPANY . . .

Charles Muller, appointed by PETROMETER CORPORATION as sales engineer for the company's line of liquid depth indicators and control instrument accessories, will work out of the Long Island City, N. Y., plant. He will also serve as factory technical representative on instrument installation and operation . . . Several appointments were announced by WORTHINGTON CORPORATION, Harrison, N. J.: Andrew F. Ward—manager of distribution, Earl R. Michel—manager of district sales, Peter A. McLeod—manager of product sales, John C. Conrad—product sales manager for centrifugal refrigeration products, Charles B. Bengle—manager of applied systems section, Paul Des Jardins—Product and Marketing Planning Department, and Fred J. Watt—New York national account supervisor . . .

Ronald N. Campbell, formerly president of Bryant Manufacturing Company, a Carrier division, has been elected a vice-president of WESTINGHOUSE ELECTRIC CORPORATION and president of its wholly-owned subsidiary, C. A. OLSEN MFG. CO., Elyria, Ohio. Westinghouse is integrating its air conditioning and home heating activities. Its Staunton, W. Va., air conditioning division, under the direction of Bruce D. Henderson, vice-president, as well as the Olsen company, will report to Mr. Campbell . . . Carl Krumrei in Chicago, and Charles Hakimian in Los Angeles, are appointed general managers of their respective branches of PHILCO DISTRIBUTORS, INC. . . .

Formerly sales manager for a burner manufacturer in Cleveland, Jack Jordan is now assistant to the president, IRON FIREMAN MFG. COMPANY of the same city. The company's chief engineer, Richard C. Wright, was elected a vice-president, to be responsible for engineering and the research and development program of the heating, power, and cooling equipment division . . . J. J. Lincoln, Jr., AIR REDUCTION SALES COMPANY vice-president, Southern Region, with offices in Houston, Tex., is appointed president of PURE CARBONIC CO., New York, N. Y., a division of Air Reduction Co., Inc. He will be succeeded by J. H. Keeney in Houston. N. F. Moody takes over as district manager of the company in Philadelphia, while H. F. Colt replaces him as district manager in Boston . . .

John T. Sanders III took up new duties as an assistant sales manager, REFRIGERATION AND AIR CONDITIONING DIV., FRICK CO., Waynesboro, Penn., as George M. Basore, formerly branch manager at Oklahoma City, replaces Mr. Sanders as branch manager in New Orleans . . . Promoted to plant manager of TACO HEATERS, INC., Cranston, R. I., is Robert B. Lynch, formerly with Textron, Inc. . . . William M. Day becomes vice-president in charge of engineering, and Gordon N. Gray assumes executive administration of all manufacturing for BRYANT MFG. CO., Indianapolis, Ind., a Carrier division . . . William P. Williams is appointed product manager for fuel burning systems and Power-Pak packaged automatic boiler, ORR & SEMBOWER, INC., Reading, Pa. Robert C. Gray is appointed assistant marketing manager for the firm . . . Three managers are appointed in the sales offices of THE TRANE CO., La Crosse, Wis.: James F. Hield in Peoria, Ill.; Robert R. Blackburn in Davenport, Iowa, and Robert W. Tobey in Pittsburgh, Pa. . . .

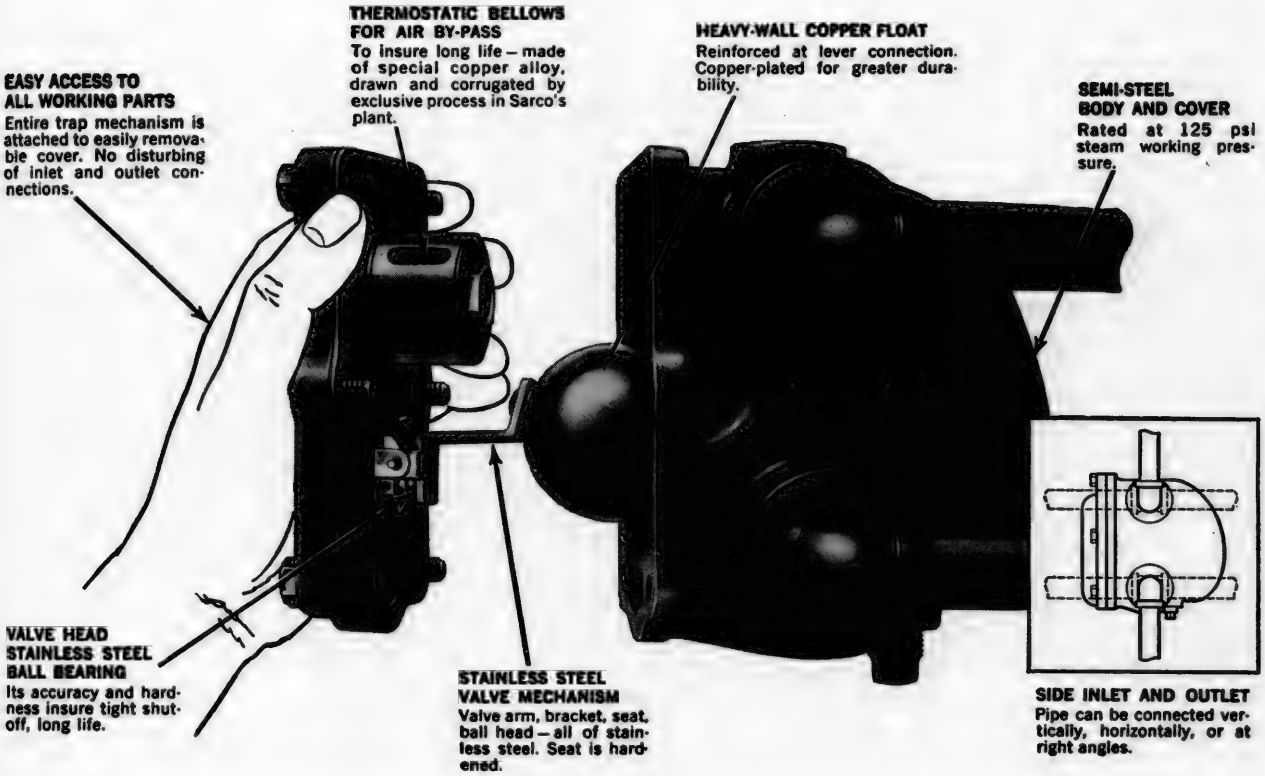
New sales manager of AIR-MAZE CORP., Cleveland, Ohio, is John Clem, who has been district manager of the company's Chicago office . . . James O. Kyle will direct sales of gas vent pipe and chimneys as Northern California district manager, METALBESTOS DIV., WILLIAM WALLACE CO., Belmont, Calif. . . . Election of Harry P. Troendly as group vice-president, Borg-Warner Corp., Chicago, Ill., was announced . . . Appointment of John H. Kauffman as district salesman for RESEARCH PRODUCTS CORP., Madison, Wis., is announced. In this capacity he will contact air conditioning and heating jobbers and manufacturers, architects and consultants in the territory of Virginia, Maryland, and Washington, D. C. . . . William F. Kelly is named manager of DUPONT'S FREON PRODUCTS DIVISION office in New York.

• Death claimed two founders of BUENSOD-STACEY, Inc., New York City. Harrison W. Marshall, 59, was vice-president and director of the company. A specialist in the air conditioning of multi-story buildings, he was active in the contracting services of the company. At one time he was chief engineer of the Tokyo branch of Carrier Corporation. Samuel E. Lyman, 68, a member of the firm's research staff, was an authority on the development of automatic controls for air conditioning.

Now...more trapping value for your money!

NEW SARCO FLOAT-THERMOSTATIC STEAM TRAP

with improved engineering features


EASY ACCESS TO ALL WORKING PARTS
Entire trap mechanism is attached to easily removable cover. No disturbing of inlet and outlet connections.
THERMOSTATIC BELLOWS FOR AIR BY-PASS
To insure long life – made of special copper alloy, drawn and corrugated by exclusive process in Sarco's plant.
HEAVY-WALL COPPER FLOAT
Reinforced at lever connection. Copper-plated for greater durability.
SEMI-STEEL BODY AND COVER
Rated at 125 psi steam working pressure.
VALVE HEAD STAINLESS STEEL BALL BEARING
Its accuracy and hardness insure tight shut-off, long life.
STAINLESS STEEL VALVE MECHANISM
Valve arm, bracket, seat, ball head – all of stainless steel. Seat is hardened.
SIDE INLET AND OUTLET
Pipe can be connected vertically, horizontally, or at right angles.

This new, improved Sarco Float-Thermostatic Steam Trap Type FT discharges condensate at steam temperature continuously and without shock.

Recommended to drip steam mains, unit heaters, blast coils, heat exchangers, and other allied process equipment, requiring accurate temperature control.

Air Binding Impossible – equipped with separate thermostatic air vent, which removes automatically and immediately all air and incondensable gases reaching trap. Balanced pressure vent self-adjusts to all operating pressures. Its location above condensate level permits discharge of air and gases reaching trap after start-up. Does not require adjustment when pressures change.

Sizes – ¾ and 1"
For steam pressures – 0 to 125 psi

Write for Bulletin 455-B to Sarco Company Inc., 635 Madison Avenue, New York 22, N.Y.

22108

SARCO

REMEMBER— only Sarco makes all types

Thermostatic Steam Traps

Liquid Expansion Steam Traps

Thermo-Dynamic Steam Traps

Float Thermostatic Steam Traps

Camlift Bucket Steam Traps

Scientific Frontiers

New Sources of Energy

Two main causes are behind augmented interest in the possibilities of non-conventional sources of energy presently under review by the United Nations Department of Economic and Social Affairs: (1) the increasing demand for energy in a world whose fossil fuel reserves are limited, and especially the requirements in under-developed areas remote from power networks and fuel supplies; and (2) the promising results now being achieved in research and in the development of new materials for related utilization of the new sources.

Based upon a comprehensive report published by the Department, this page will begin this month to briefly outline the five new energy sources (solar energy, wind energy, tidal energy, geothermic energy, and thermal energy of the seas), and then in succeeding months present their characteristic features and their application to electric power supply and to other functions including production of fresh water; heating, refrigeration, and air conditioning; and mechanical power.

Solar Energy. Basic processes for converting solor radiation into useful energy may be divided into two general groups: those related to heat and those related to light. Thermal processes are now being developed either for obtaining heat at various temperatures or for direct conversion of solar heat into electricity.

The range of temperatures achieved depends mainly on the degree of concentration of solar radiation obtained by the collectors used. Low temperatures (below 212 deg F) are easily obtained using flat plate collectors, and low-temperature processes have applications which include heating and distillation of water. Lenses of reflecting mirrors are necessary to obtain temperatures beyond a few hundred degrees. As these lenses capture only the direct radiation of the sun, they must be turned frequently to keep the sun focused. The heat captured and the temperature obtained depend upon the quality of the reflecting surface and the precise shaping of the parabolic collectors. Accordingly, a distinction will be made between medium temperature devices, which produce temperatures below 1000 deg C, and high temperature furnaces, producing temperatures ranging from 1000 to 3500 deg C.

Wind Energy. Wind energy has long been used for mechanical water pumping. However, modern utilization is aimed more toward the production of electricity, and studies in this field range from wind surveys to advanced plant design and testing. Electricity-producing windmills are in commercial production or actual operation in several countries, including Australia, Canada, Denmark, France, Germany, the Union of South Africa, the Soviet Union, the United Kingdom, and the United States.

The kinetic energy in a column of moving air or wind, which increases in cubic proportion to the velocity of the wind, is intercepted by a rotor or propeller which transforms the energy into usable mechanical power. The basic elements determining the energy obtainable are the speed of wind, size of the area swept by the rotor, and conversion efficiency of the plant.

Whatever the diameter of the rotor chosen, electric windmills are designed to give their maximum power capacity at a determined or "rated" wind speed. Energy in a wind of velocity beyond the rated speed is wasted, and in the case of wind with lower velocity, the energy input and conversion efficiency of the plant decrease rapidly. Windmills may in theory extract close to 60% of the power in the wind but, in practice, losses in the rotor and gearing, and electrical losses are likely to reduce the over-all efficiency to some 40% or less.

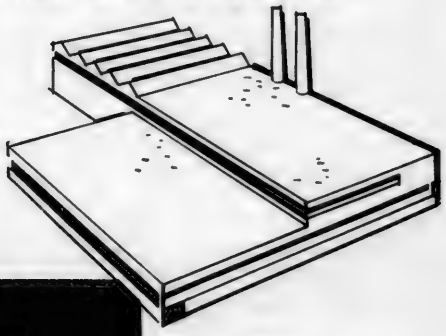
HOFFMAN STEAM SPECIALTIES

Designed and Engineered to Meet Industry's Needs

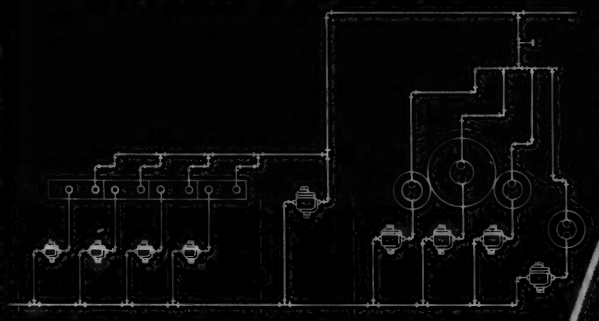
- Heating Systems
- Manufacturing
- Processing

600 SERIES INVERTED BUCKET TRAP

For draining condensate and air from equipment such as: steam cookers, steam heated vats in process work, unit heaters, steam coils, pressers, corrugated paper making machines and for lifting condensate to overhead return mains.



TYPICAL APPLICATIONS



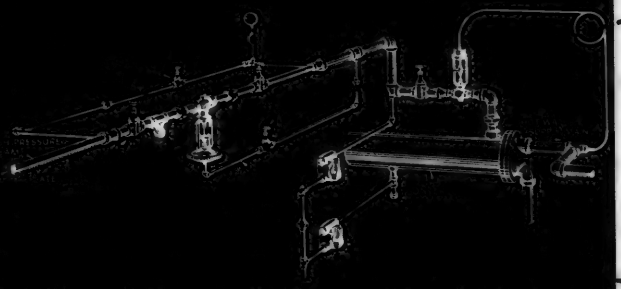
Draining Corrugated Paper Making Machine

400 SERIES DIRT STRAINER

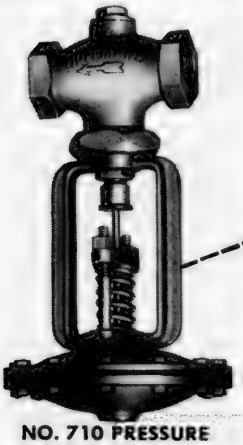
To protect valves, traps and pumps from damage caused by dirt, rust and scale. For use on steam, water, oil or gas service.

SERIES 1110 TEMPERATURE REGULATOR

To regulate supply of steam to the heating coils in converters, cookers, processing tanks, sterilizers and water heaters.

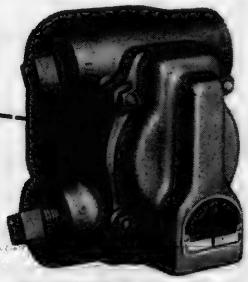


Converter for Heating Water with High Pressure Steam



NO. 710 PRESSURE REDUCING VALVE

To reduce the pressure of fluids from a higher initial pressure to a lower second pressure. Designed to meet varying requirements necessary to control fluids, such as steam, air, oil or gas.



50 SERIES F & T TRAP

To release condensate and air and to prevent release of steam in steam systems. Extremely quiet in operation therefore, ideal for schools, hospitals, churches, offices and apartments.

HOFFMAN SPECIALTY MFG. CORP.

1700 West 10th Street, Indianapolis 7, Indiana

YORK

ZONE COOLING PLAN SAVES $ $ $ $ $ $ BECAUSE IT MAKES SENSE!

IT MAKES SENSE TO

Add Air Conditioning Step By Step! Businesses that require more than one York Air Conditioner, but have limited budgets, can condition the important zones first and add the remainder later.

IT MAKES SENSE TO

Air Condition Only Those Areas That Require It! No need to air condition unimportant areas that waste cooling power, operating costs!

IT MAKES SENSE TO

Save On Installation! When remodeling or modernizing existing buildings, York Packaged Units may be installed without tearing down the walls. Installations are made quickly, easily—often without disrupting normal business routine!

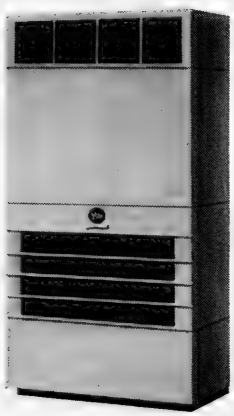
IT MAKES SENSE TO

Operate Units Independently! On mild, summer days, or when certain areas are unoccupied, only the units needed are turned on. The purchaser pays operating costs only on those units actually in use! And, if one unit should need servicing, there's no need to shut down the entire system!

Most Practical Way Ever To Air Condition Area By Area...Floor By Floor...Room By Room

Think it over—then call York! We'll show you exactly how our new Zone Cooling Plan works... how it utilizes two or more of the world's finest, most efficient "packaged" air conditioners to solve every special cooling problem in a practical new way!

York Zone Cooling Installations may be purchased—or, they may be leased under the terms of a new arrangement that requires no capital outlay...saves tax dollars...conserves credit. For full details, contact: York Corp., Packaged Products Dept., York, Pa.



York Packaged Air Conditioners Available in 3, 5, 7½, 10, 15 and 22½ HP sizes.

Your FUTURE and FORTUNE Now Lies With York!

YORK

York Corporation, York, Pa.
Subsidiary of Borg-Warner Corporation

Got a Real Tough Starting Problem ?

Single-phase Type RA ½ to 15 hp.

Wagner Repulsion-Start Induction Motors start heavy loads with low current

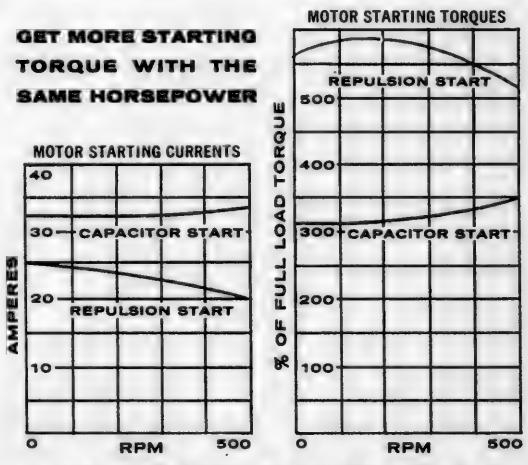
The Wagner Type RA is the work-horse of the single-phase motor field. It combines high starting torque for quick, easy starts with low starting current and minimum light flicker. It has a constant high operating speed, even under overload, and a flat efficiency curve over a wide operating range.

You practically eliminate service problems when you power tough single-phase applications with Wagner RA Motors. They have unmatched ability to start high inertia or heavy friction loads repeatedly and they give many years of unfailing service.

Let a Wagner Sales Engineer show you how these motors can be applied to your needs. Call the nearest branch office or write for Bulletin MU-220.

Wagner Electric Corporation
6400 Plymouth Ave., St. Louis 14, Mo.
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

GET MORE STARTING TORQUE WITH THE SAME HORSEPOWER



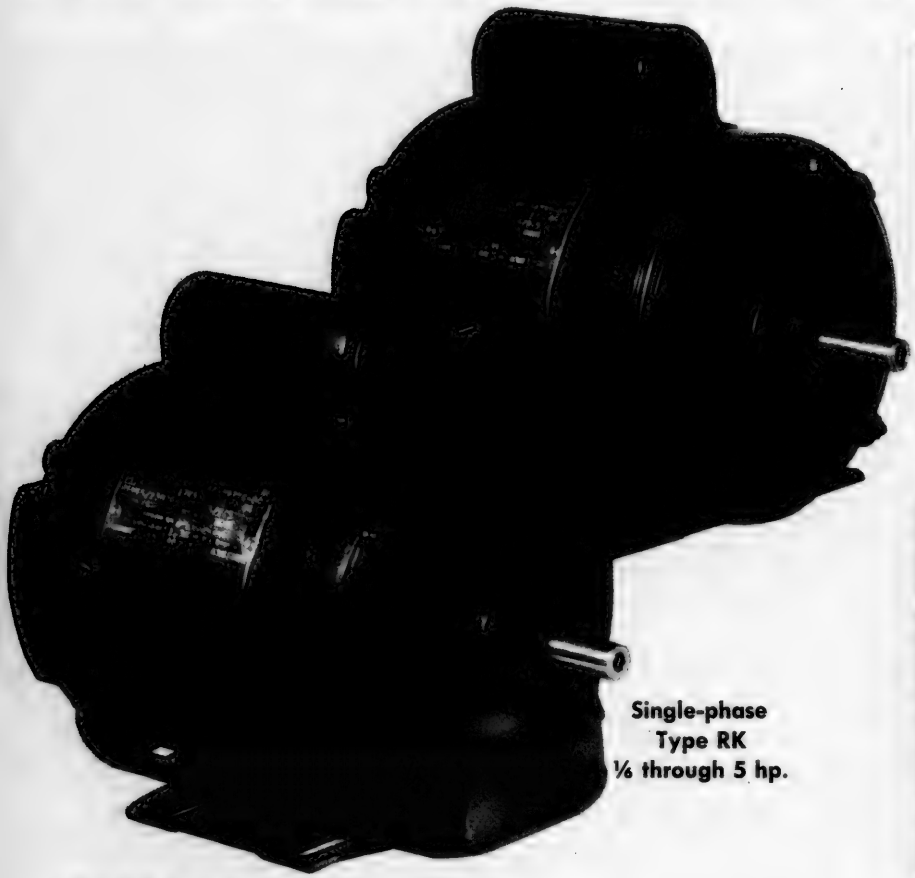
ONE HP, 1750 RPM, 60 CYCLES, 230 VOLTS

Integral Ratings, 1-5 hp are available in the latest NEMA Frame Sizes

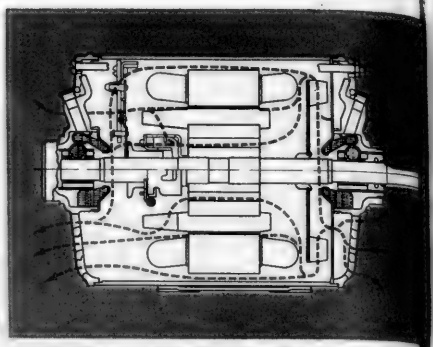
H. P.	OLD FRAME SIZE	PRESENT FRAME SIZE
1	203	182
1½	204	184
2	224	213
3	225	215
5	254	254U

4 pole (1750 RPM, 60 cycle and 1450 RPM, 50 cycle) ratings are interchangeable in mounting dimensions with capacitor start motors of the same ratings.

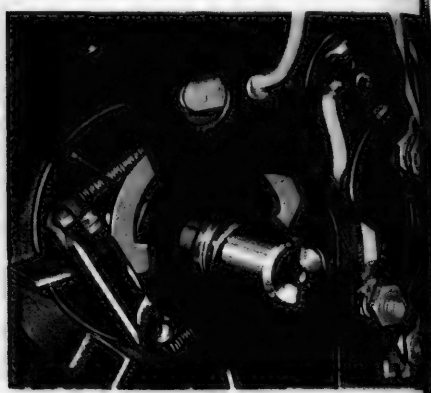
Got a Normal Starting Application?



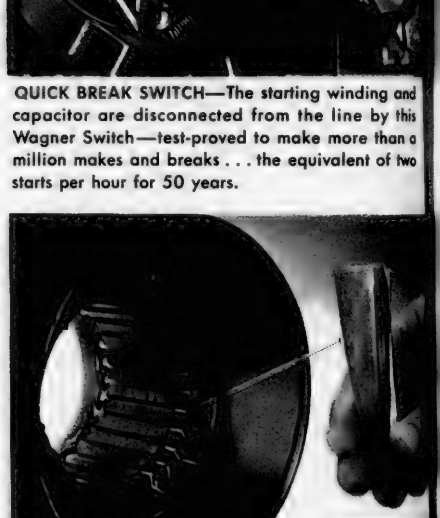
Single-phase
Type RK
⅙ through 5 hp.



EFFICIENT COOLING SYSTEM—The improved ventilating system used in these motors directs a large volume of air through the motor to effectively reduce temperatures and add to motor life. Cross section above indicates direction of air flow.



QUICK BREAK SWITCH—The starting winding and capacitor are disconnected from the line by this Wagner Switch—test-proved to make more than a million makes and breaks . . . the equivalent of two starts per hour for 50 years.



MYLAR* INSULATION— Mylar-paper laminated slot insulation gives top protection against moisture, adds thermal stability, to give more application versatility and longer life when unexpected overloads occur.

*DuPont Trademark

WAGNER CAPACITOR-START MOTORS provide dependable starts... long troublefree life

Here's the single-phase general purpose motor that gives more horsepower with less bulk—is rugged enough to permit direct mounting, compact enough to fit in tight spots. Available with sleeve or ball bearings — with rigid bases or with resilient mountings for exceptionally quiet operation.

ALL-ANGLE OPERATION

The sleeve bearing design in fractional hp ratings, has a positive lubrication system that permits operation in any position. All angle mounting can mean important savings in initial costs to manufacturers—can help the design engineer in a tight spot.

You can get these motors from leading motor distributors in your community and from Wagner Sales Offices in 32 principal cities. Your Wagner Sales Engineer will be glad to help you select the right motor for your application. Wagner Bulletin MU-217 gives full details.

Wagner Electric Corporation
6400 Plymouth Ave., St. Louis 14, Mo.
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

WAGNER "48" SPLIT PHASE MOTORS . . . 1/6, 1/4, 1/3 hp.

for low starting torque requirements

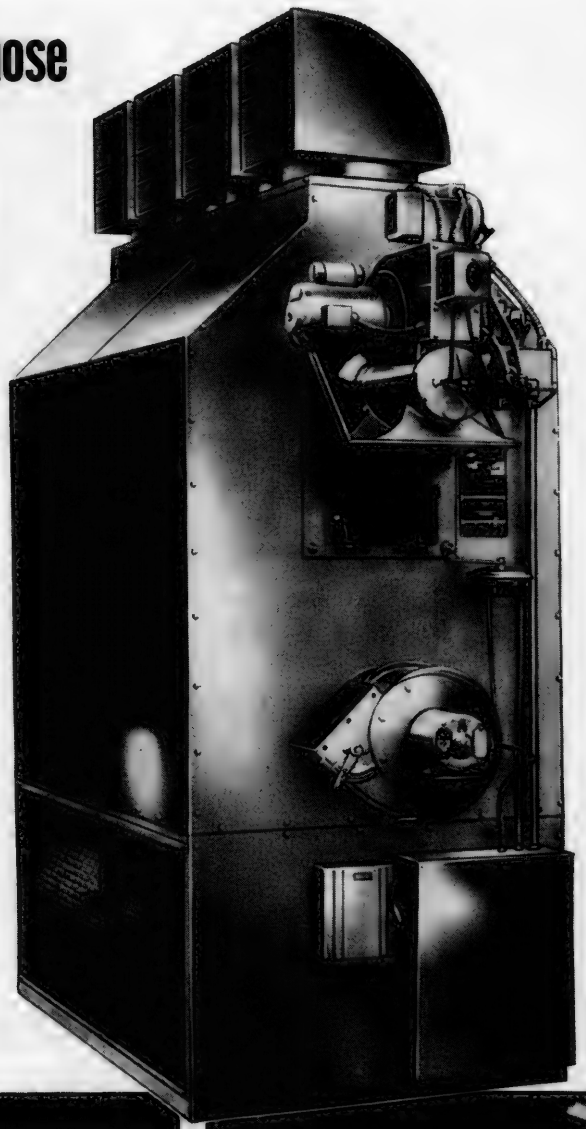
If you need a small fractional horsepower motor for use on fans and blowers or on a wide variety of easy-to-start machines and appliances, you can't beat the Wagner "48" Type RB Motor. It offers all the advantages of the Type RK described above, with the exception of high torque capacitor starting. This smaller, lighter, limited use motor can solve many application problems economically.

WH58-

Specify LENNOX for those

BIG heating jobs!

FROM THE WORLD LEADER IN WARM AIR HEATING COMES THIS NEW FIELD-PROVED INDUSTRIAL HEATER . . . 400,000 to 2,000,000 Btu/h



Installation flexibility; that's the Lennox "AT" series industrial heater. No task too large or small—designed for space heating, make-up air, drying or oven application—with your option of floor, horizontal or inverted units. And you can use oil, gas or combination fuel. In every installation Lennox engineering produces *exceptional* efficiency. Here are just a few of the reasons:

- ***4-pass counter flow design*—gets more heat from the flame (no internal baffles).**
- ***Double casing with metal radiation shield*—provides insulating curtain of air to hold DOWN cabinet heat losses.**
- ***Stainless steel combustion chamber*—prevents failure due to unrelieved stress. Warranted for 10 years!**
- ***One master controller. . .*eliminates non-standard, hard-to-replace control system components.**

Send for complete engineering data and specifications; see for yourself why plant engineers the country over are specifying Lennox "AT" series heaters!

One of four Lennox gas-fired heaters at C. A. Roberts Company, Detroit mfr. of steel tubing. Mounted at ceiling height, this space saving 500,000 Btu/h heater is tailored to the job.

Two oil-fired Lennox heaters in Wheelock-Lovejoy's steel warehouse (Centerline, Mich.) provide warm air heating for 20,000 sq. ft. Units are 750,000 and 1,000,000 Btu/h capacity.

Five gas-fired Lennox heaters at Wm. Montgomery Co. warehouse, King of Prussia, Pa. Fresh air introduced by heaters replaces the truck-exhaust foul air.

LENNOX Industries Inc.

INDUSTRIAL DIVISION

1701 EAST EUCLID • DES MOINES, IOWA

- - - *Today*

LENNOX INDUSTRIES INC.
Industrial Division, Dept. A-4
1701 East Euclid, Des Moines, Ia.

Please send me—without obligation—complete specifications and engineering data on Lennox AT series Industrial Heaters.

Name_____

Company_____

Address_____ City_____

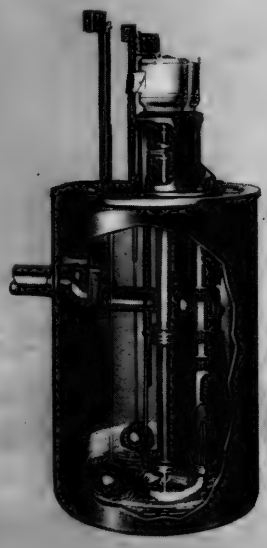
Title_____

"from Chicago"

More than 12,000 installations

FLUSH KLEEN® Sewage Pumps Service Dallas Statler Hotel

Jaros, Baum and Bolles, *mechanical engineers* • William B. Tabler, *architect* • Robert E. McKee, Inc., *general contractor* • J. S. Brown, and E. F. Olds, *plumbing contractors*



Duplex type F "FLUSH KLEEN" Sewage Pump

Chicago Type F "FLUSH KLEEN" Sewage Pumps were selected to provide uninterrupted service for the 15 million dollar, 18 story Dallas Statler . . . one of the largest hotels in the southwest, with 1,001 guest rooms, a ballroom equipped to accommodate over 3,000 persons and luxurious dining and social rooms. "FLUSH KLEEN" Sewage Pumps are standard equipment in fine buildings everywhere.

THEY ARE COMPLETELY CLOG-PROOF!

Only liquid is handled by the impeller. Solids and other coarse matter are retained in the strainer housing until cleanly flushed to the sewer.

Chicago "FLUSH KLEEN" Sewage Pumps are sold and serviced by competent Distributors located in most principal cities. See the one nearest you today or write direct for full details.

Putting Ideas to Work

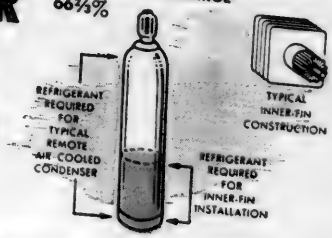
FOOD MACHINERY AND CHEMICAL CORPORATION

Chicago Pump Company

622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

What's NEW in Remote Air Cooled Condensers? *This*

A REMOTE AIR COOLED CONDENSER THAT REQUIRES ONLY 1/3 OF THE REFRIGERANT CHARGE USED BY COMPETITIVE MODELS

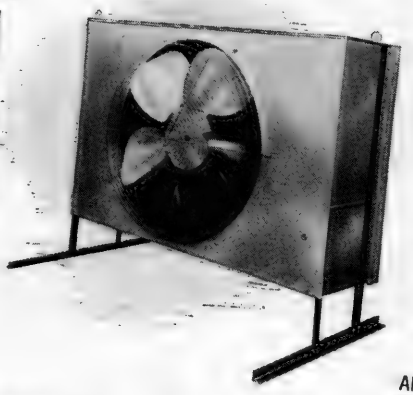

AVERAGE SAVING ON REFRIGERANT CHARGE 66⅔%
REFRIGERANT REQUIRED FOR TYPICAL REMOTE AIR COOLED CONDENSER
TYPICAL INNER-FIN CONSTRUCTION
REFRIGERANT REQUIRED FOR INNER-FIN INSTALLATION

A RECENT 300 TON JOB SHOWED SAVINGS OF 1800 LBS. OF REFRIGERANT THROUGH USE OF THESE UNITS.

Yes, the Dunham-Bush 'BC' Remote Air Cooled Condensers with famous Inner-Fin construction mean savings of 67% in refrigerant charge. Additionally, they mean smaller receivers and minimum loss if the system charge is lost. In these expertly planned units, the exclusive Inner-Fin construction diminishes the internal volume of the coil while increasing the heat transfer coefficient. And higher heat transfer factors permit design of more compact units, saving valuable space in installation.

AS MUCH AS 53.5 TON CAPACITY IN ONE UNIT

The Dunham-Bush line of 'BC' Remote Air Cooled Condensers includes models in 13 sizes with capacities ranging from 2.2 tons to 53.5 tons, making possible use of a single unit for practically any job !



FOR ALL 'ROUND PROTECTION

Plastic vinyl paint is applied to all ferrous parts of unit casing and structure in three stages:

PRIMER—a polyvinyl plastic combined with zinc chromate.

INTERMEDIATE—a vinyl resin with high lead content.

FINISH—hard grey, all weather resistant plastic vinyl.

All interior surfaces of the unit casing are given an extra finish coat of plastic vinyl.

AND FOR MAINTAINING SATISFACTORY HEAD PRESSURES

at all ambients, Dunham-Bush engineers offer the 'PS' Pressure Stabilizer.

'PS' units can be mounted indoors near the compressor, facilitating the making of necessary adjustments. They are thoroughly factory tested and assembled, and require connection only to the refrigerant liquid and discharge lines. No extra piping or special loops required. Regulating valve gives smooth pressure control and eliminates wide pressure fluctuations inherent in other head control systems.

The name Dunham-Bush is synonymous with efficient, satisfactory service for all types of pressure and temperature conditions. For technical assistance, our engineering staff is at your service. For more information, contact us.

Dunham-Bush, Inc.

DUNHAM-BUSH

WEST HARTFORD 10 • CONNECTICUT • U. S. A.

WEST HARTFORD, CONNECTICUT • MICHIGAN CITY, INDIANA • MARSHALLTOWN, IOWA • RIVERSIDE, CALIFORNIA • UTICA, NEW YORK

SUBSIDIARIES

heat-x HEAT-X, INC. BREWSTER, N.Y.

BRUNNER THE BRUNNER CO. GAINESVILLE, GA.

DUNHAM-BUSH (CANADA), LTD. TORONTO, CANADA

DUNHAM-BUSH, LTD. LONDON, ENGLAND

BRUNNER CORPORATION (CANADA) LTD. PORT HOPE, ONTARIO

Skidmore

There's a Skidmore Pump designed for each and every heating requirement. *Write for bulletins*

THE SKIDMORE VACUUM PUMP

"Maintained Efficiency"

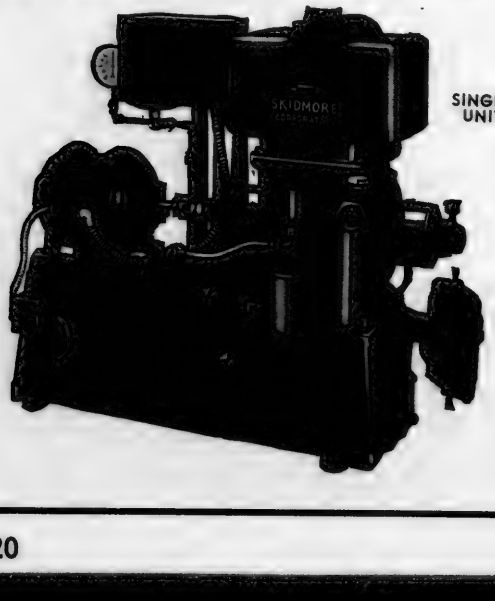
NS
ANT"

DUPLEX
UNIT

SKIDMORE PUMPS EFFICIENCY

GREATER EFFICIENCY AND CAPACITY

Both the single and duplex unit automatically adjusts itself to the varying conditions of the system. Capacities ranging from 5,000 to 100,000 sq. ft. EDR.



SINGLE
UNIT

ALL THE FEATURES YOU WANT — ARE FOUND IN THE SKIDMORE VACUUM AND BOILER FEED PUMPS

Perfect balance, structural simplicity and greater increase in efficiency is attained as compared to other pumps of the hydraulic type. Liberal clearance between moving parts positively eliminates wear. That is why all Skidmore Vacuum Pumps are famous for—"Maintained Efficiency."

Because wear is eliminated, the capacity and efficiency remain constant year after year without adjustment or expensive repairs. When you choose a Skidmore Vacuum Pump, you can do so with confidence, knowing that ten years from now it will still be performing its full duty satisfactorily.

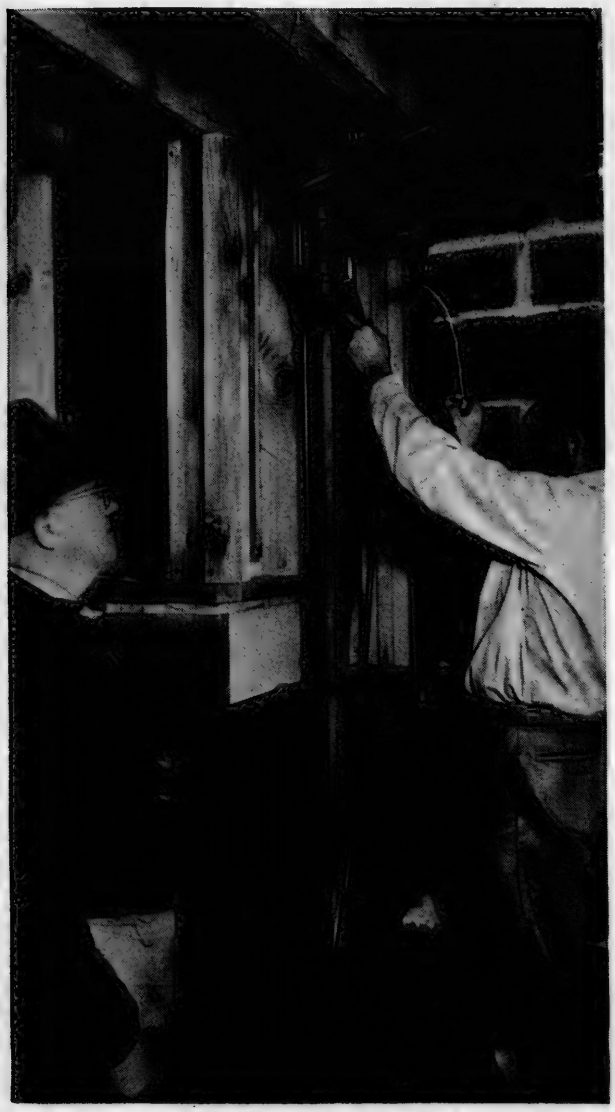
Write today for descriptive bulletin

Skidmore PUMPS

SKIDMORE CORPORATION
ST. JOSEPH, MICHIGAN

PARTIAL VIEW of Rockledge Homes, Abington Township, Penna. All 106 homes have Anaconda copper tube sanitary drainage lines.

"I do a better job at lower cost—with Copper"



J. L. FITZPATRICK of J. L. Fitzpatrick & Sons, Jenkintown, Penna., plumbing contractor for Rockledge Homes development, watches journeyman Sam Duper, Jr., connect a 3-inch copper tube soil line from bathroom to the stack. Anaconda Tube for the development was supplied by Fleck Company, Elkins Park, Penna., plumbing supply wholesaler.

J. L. Fitzpatrick switched to Anaconda copper tube for sanitary drainage lines—finds installation easier — gives builders and homeowners superior plumbing systems.

"We all know that copper plumbing is best and there's no mystery about the cost angle," said J. L. Fitzpatrick.

"It is simply a matter of copper tube and solder-joint fittings being so much easier and faster to install. Copper handles right. . . . It's light and easy to cut. And where you have long runs, the 20-foot lengths of copper tube eliminate many joints. We also save the time and trouble of making threaded or caulked connections.

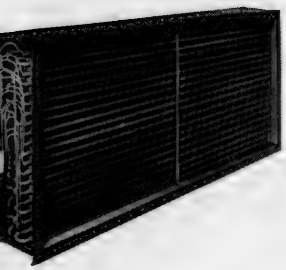
"And our men like to work with copper, not only because it's easier—but because they can turn out a neat, trim job they're proud of."

More and more plumbing contractors are standardizing on copper tube for drainage lines for the reasons given by Mr. Fitzpatrick. And in areas where plumbing codes were written years ago, contractors are asking for revisions to include copper tube as an approved material for sanitary drainage systems.

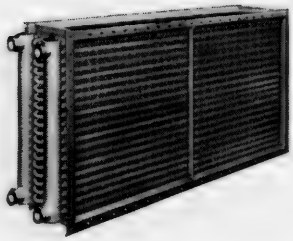
Builders and owners also benefit from all-copper plumbing in many ways. A 3" copper tube stack with fittings can be installed in standard 4"-wide partitions. Carpentry, lumber, and space are saved. Plumbing can be laid out to meet owners' wishes regarding location of fixtures and appliances. All-copper plumbing is a mark of quality—a sign of low maintenance and high resale values.

Write for descriptive literature on ANACONDA ALL-COPPER plumbing. Address: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario. 5801

ANACONDA®
COPPER TUBE and FITTINGS
Available through plumbing wholesalers
Made by
THE AMERICAN BRASS COMPANY

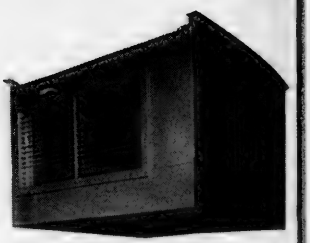


Quay Direct Expansion coils have the lusive Ripple-Fin and staggered tube struction for maximum heat transfer, ngth and rigidity. Made in an ex- tionally wide variety of sizes, styles l capacities to meet the requirements very application.

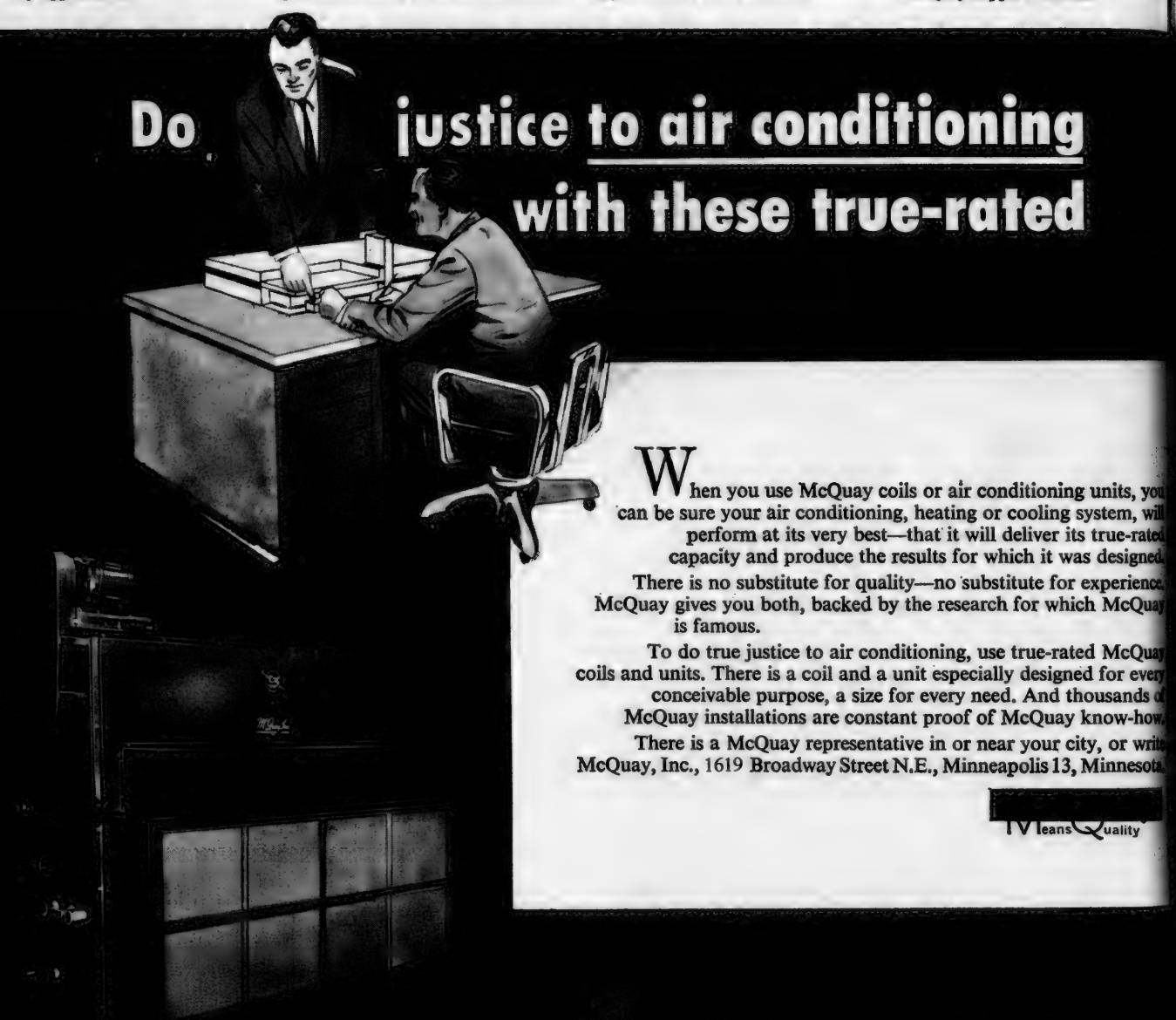


McQuay Water Cooling coils are available in a wide variety of sizes, styles and capacities, 1 to 10 rows. Staggered tubes and rippled fins create air turbulence to give maximum air side heat transfer. Mechanical expansion bond insures permanent metal to metal construction.

Floor Type Seasonmaker for free standing floor mounting. 4 sizes, 200 cfm to 600 cfm, ½ to 2 ton nominal cooling capacity. Thermally and acoustically insulated. Choice of 3 air discharge grilles. Basic type for fully recessed applications is also available.



Ceiling Type Seasonmaker. For suspended mounting. Seven sizes from 200 cfm to 2000 cfm, ½ to 5 ton nominal capacity. Thermally and acoustically insulated. Designed for multi-room buildings. All units have the famous McQuay Ripple-Fin coils.



Do justice to air conditioning with these true-rated

When you use McQuay coils or air conditioning units, you can be sure your air conditioning, heating or cooling system, will perform at its very best—that it will deliver its true-rated capacity and produce the results for which it was designed.

There is no substitute for quality—no substitute for experience. McQuay gives you both, backed by the research for which McQuay is famous.

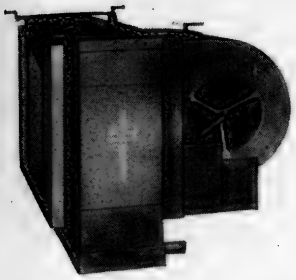
To do true justice to air conditioning, use true-rated McQuay coils and units. There is a coil and a unit especially designed for every conceivable purpose, a size for every need. And thousands of McQuay installations are constant proof of McQuay know-how.

There is a McQuay representative in or near your city, or write McQuay, Inc., 1619 Broadway Street N.E., Minneapolis 13, Minnesota.

TV leans Quality

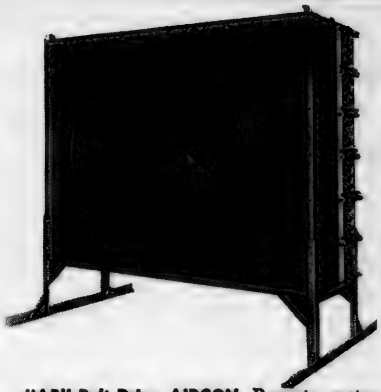
Horizontal Seasonmaster Central Station Air Conditioner.

Vertical Seasonmaster Central Station Air Conditioner.



Hideaway Type Seasonmaker. For concealed suspended mounting. Seven sizes from 200 cfm to 2000 cfm, ½ to 5 ton nominal capacity. Will furnish individual room comfort at any desired temperature, —heated, filtered air in the winter; cooled, dehumidified and filtered air in the summer.

"AR" Residential AIRCON. Remote type air cooled condenser designed for extra quiet operation as required in residential applications. It will operate efficiently with R-12 or R-22 compressors without the use of water. Available in 2, 3, 5, and 7½ ton nominal capacities.



"AB" Belt Drive AIRCON. Remote, waterless condenser available in eight sizes—9, 11, 15, 20, 25, 30, 40 and 50 ton nominal capacities in individual units. Lifetime ball bearing and slow speed propeller type fan. Type "AD" Aircons are also available in 2, 3, and 5 ton nominal capacities.

coils units

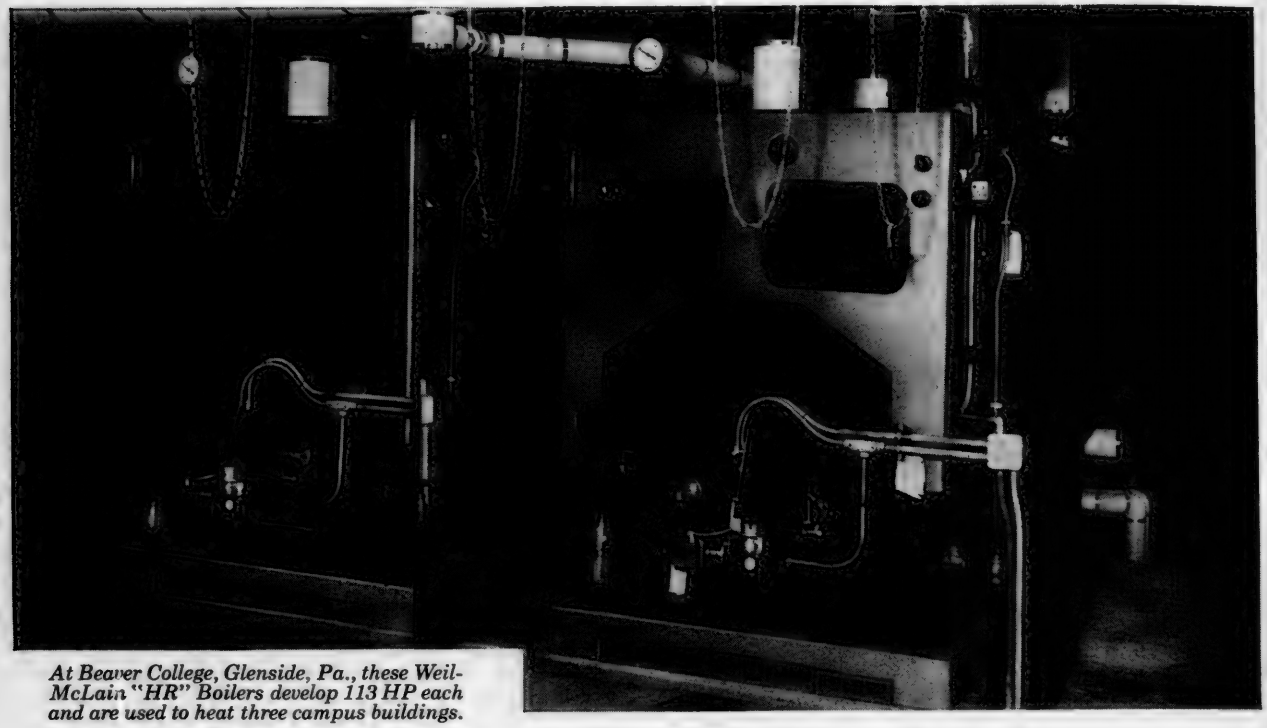
"RH" Air Conditioner. Water and direct expansion models in four sizes from 1000 cfm to 3000 cfm. Heating coils for use [illegible] or hot water and cooling coils for use with water or Freon are available to provide year 'round operation. Can be [illegible]

Horizontal Multi-Zone Air Conditioning Unit. Outside weather conditions or inside requirements [illegible] some [illegible] that other sections require cooling. Ten sizes from 1370 cfm to 29000 cfm. Available with 6 to 22 zones.

Vertical Multi-Zone Air Conditioning Unit. Specifically designed for [illegible] and cooling. Eight sizes from 1370 cfm to 21000 cfm. This unit is so constructed that it can deliver to any one of many different zones [illegible] humidified air, or heated, filtered and humidified air, or a mixture.

McQuay INC.

AIR CONDITIONING
HEATING
REFRIGERATION



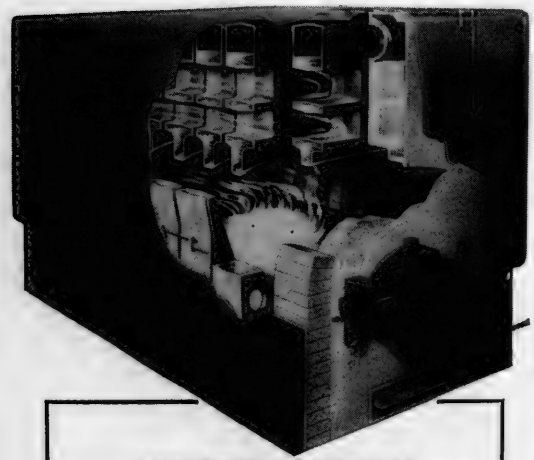
At Beaver College, Glenside, Pa., these Weil-McLain "HR" Boilers develop 113 HP each and are used to heat three campus buildings.

Consulting Engineer: Ernest D'Ambly, Engineers Philadelphia, Pa.
Contractor: Gray and Dormer, Philadelphia, Pa.
Distributor: J. D. Johnson, Camden, N. J.

Selected for
OUTSTANDING PERFORMANCE
ON LOW-COST HEAVY OIL

The selection of this pair of Weil-McLain "HR" Boilers as replacement units was dictated by their proved efficiency when equipped with horizontal rotary burners using heavy oil. Among the design features which assure the most favorable burning conditions and efficient heat absorption are:

1. Large firebox volume develops better combustion conditions and maximum radiant heat transmission.
2. Curved primary heating surface extends from crown sheet, greatly increasing area directly above the fire.
3. Balanced gas travel through the flueways assures equal distribution of heat to all secondary heating surfaces.
4. Generous waterways permit rapid, efficient water circulation through boiler.
5. Large steam space assures rapid generation of dry steam.
6. Rugged cast iron construction for durability and trouble-free operation.
7. Individual short draw rods simplify assembly and contribute to longer boiler life.
8. Steel front plate simplifies installation of rotary burner.
9. High base makes more combustion space available—eliminates high brick foundation.



CERTIFIED RATINGS

"Certified Ratings" are determined from a series of tests conducted with regularly listed I-B-R approved Weil-McLain 0-40 and 0-44 Heavy Duty Boilers. These tests were conducted in accordance with the provisions of the I-B-R Testing and Rating Code for Low Pressure Cast Iron Heating Boilers where special burners are used. A horizontal rotary burner was employed, using oil with a heat value of 150,000 BTU per gallon.

WEIL-McLAIN "HR"
HEAVY DUTY BOILERS FOR HORIZONTAL ROTARY OIL BURNERS

WEIL-McLAIN BOILERS RADIATORS

WEIL-McLAIN COMPANY
MICHIGAN CITY, INDIANA

Address literature requests to Dept. BB-48

HOWEVER YOU WRITE IT, BE SURE TO SPELL IT

Reading Copper Tube

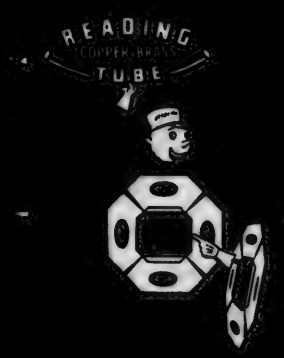
The fact that Reading Tube is second to none in quality is not the only reason contractors keep *reordering* it. The big plus is the "Shirt-Sleeve Service" that accompanies this fine product. At the Reading plant, every executive personally follows up the individual needs of distributors and their contractor accounts. Their efforts are backed by Reading Depots thruout the U.S., stocked to meet any shipping emergency.

Preserve your peace of mind and your customer good will by specifying Reading when you order copper tube. Then, you can count on getting *exactly* what you want — *exactly* when you want it!

BUY READING TUBE— MADE IN AMERICA

On "Shirt-Sleeve Service" You Can Rely

If READING Tube You Specify!

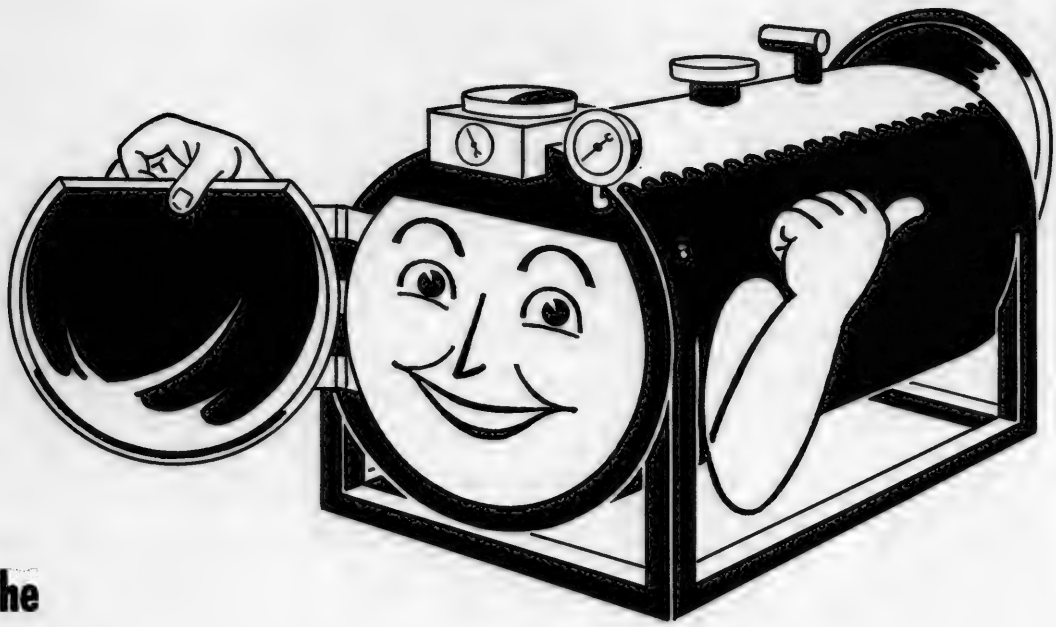


READING TUBE CORPORATION

Empire State Building, New York 1, N. Y. • Plant: Reading, Pa.

Distribution Depots:

READING, PA.
WOODSIDE, L.I., N.Y. 57-17 Northern Blvd.
PHILADELPHIA, PA.
CHICAGO, ILL. 724 W. 50th St.
CLEVELAND, OHIO 4615 Perkins Ave.
ATLANTA, GA. 690 Murphy Ave. S.W., Unit 5, Bldg. B
DENVER, COLO.
LOS ANGELES, CALIF. 120 No. Santa Fe Ave.
OAKLAND, CALIF. 410 Hegenberger Road
HOUSTON, TEXAS 1121 Rothwell St.
DALLAS, TEXAS 9000 Sovereign Row Brook Hollow Ind. Dist.



The Boiler that doesn't show its age

The practical, two-pass design of the Continental Automatic Boiler is a long-life feature that cuts operation and maintenance cost. The hinged doors – front and back – open on the burner. No baffles or partitions that can be damaged in routine servicing. No take-out, put-back refractories.

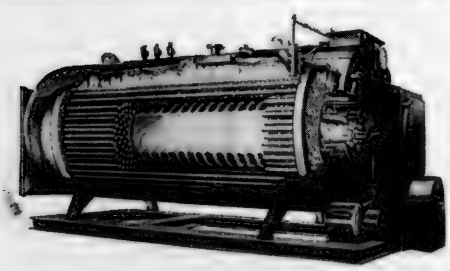
Continental's exclusive "spinning gas" technique heats all return tubes fully and evenly in just two passes, assuring longer service life. Free, rapid water circulation improves heat transfer and keeps heating surfaces clean.

Low maintenance is just one of the cost-saving features of the Continental Automatic Boiler. Every Continental is fire-tested and guaranteed for better than 80% efficiency. Owners report fuel savings up to 33% . . . and Continental efficiency stays constant over a wide load range and a long service life.

Continental Boiler Service, available from coast to coast, includes aid and supervision in start-up, operating instruction for attendants, competent and dependable service when needed. See your service-minded Continental Boiler representative or write for Bulletin BE-3.

BOILER ENGINEERING & SUPPLY COMPANY, INC.
Manavon Street, Phoenixville, Pa.

The **Continental** AUTOMATIC BOILER

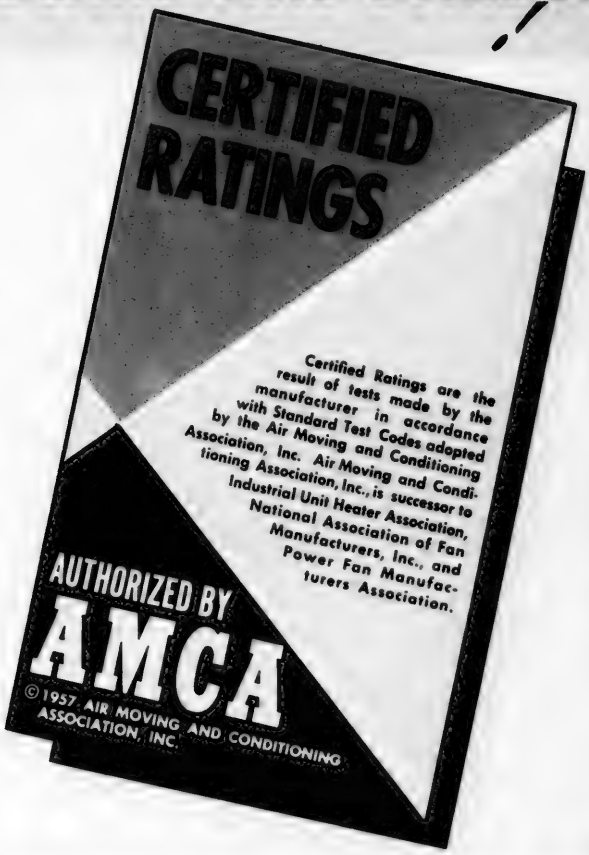


Cut-away view of typical Series A Continental Automatic Boiler, firing oil and/or gas. Other models from 20 to 500 hp, with on-off, low-high-low or modulating controls. For steam heating or process work at pressures from 15 to 250 pounds, or for hot water heating at low or high temperatures.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

BE SURE THAT THE STANDARD CATALOGUED AIR MOVING EQUIPMENT YOU SPECIFY OR USE BEARS THIS SYMBOL

It is your best assurance of properly rated air moving equipment


CERTIFIED RATINGS
Certified Ratings are the result of tests made by the manufacturer in accordance with Standard Test Codes adopted by the Air Moving and Conditioning Association, Inc. Air Moving and Conditioning Association, Inc., is successor to Industrial Unit Heater Association, National Association of Fan Manufacturers, Inc., and Power Fan Manufacturers Association.
AUTHORIZED BY
AMCA
© 1957 AIR MOVING AND CONDITIONING ASSOCIATION, INC.

Every possible precaution to protect you against incorrect or improper performance ratings has been provided for in the Certified Rating Program of the Air Moving and Conditioning Association.

As a result, you can rely on published performance data of centrifugal, axial, and propeller fans, and power roof ventilators which carry the AMCA Certified Rating Seal.

HERE'S HOW AMCA CERTIFIED RATINGS PROTECT YOU

All Tests Must Be Made in AMCA Qualified Laboratories

To qualify for AMCA Certified Ratings, products must be tested in a laboratory approved by AMCA after careful inspection of test equipment, procedure, and personnel.

All Ratings Determined by Uniform Test Code

Manufacturers' published performance ratings for AMCA certified products must be the result of tests and permitted calculations made according to the AMCA Standard Test Code.

Protection Against Misuse of the Certified Rating

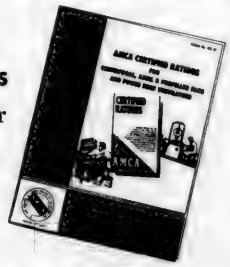
The Certified Rating Seal is the property of AMCA. The right to use it may be withdrawn for any violation of the license agreement between AMCA and the manufacturer.

Additional safeguards provide for check of manufacturers' published performance ratings; and for periodic inspection of qualified test laboratories.

Manufacturers Qualified for AMCA Certified Ratings

The leading U.S. and Canadian manufacturers of air moving equipment are participating in this program. While space limitations do not permit a complete listing here, this information is available upon request to AMCA.

Product Specifiers
Write for Bulletin 153-57



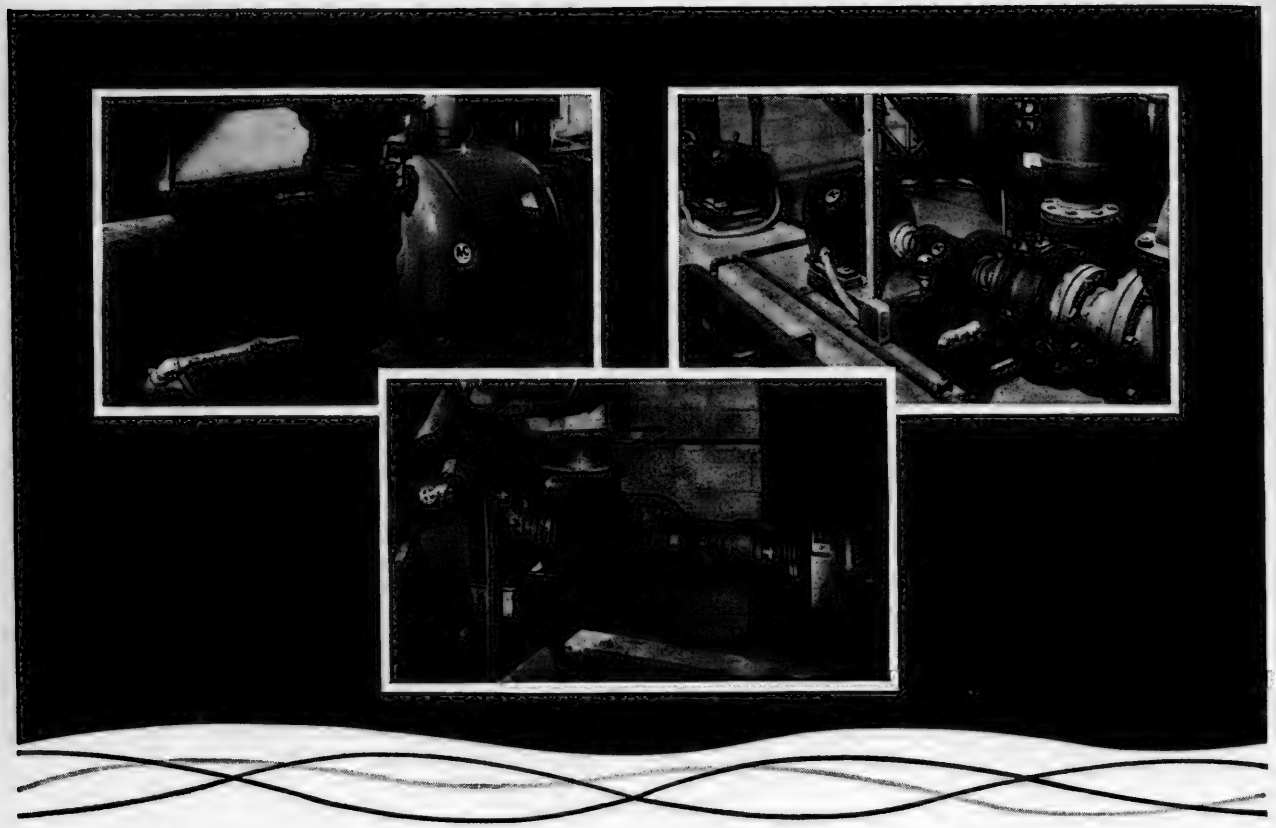
Product Users
Write for Bulletin 152-57

FOR YOUR OWN PROTECTION, SPECIFY "ACCORDING TO AMCA CERTIFIED RATING" FOR STANDARD PRODUCTS COVERED IN THIS PROGRAM

LITHO IN U

AIR MOVING & CONDITIONING ASSOCIATION, INC.

8150 GUARDIAN BUILDING



for 99% of all air-conditioning applications...

there's a RIGHT Allis-Chalmers PUMP

TYPICAL of Allis-Chalmers pump line is this model with variations in both fractional and integral horsepower sizes. All close-coupled models have only two base sizes for the entire range.

WHATEVER the air-conditioning application, there's sure to be the correct Allis-Chalmers pump for the job. The reason: A-C pumps are assembled for *your* application from standard components. This is truly "standardized specialization" — tailored pumps at a mass-production price.

Close-coupled, horizontal, sidewall-mounted and submersible models are all available with a wide choice of mounting methods. Whatever type of conditioning equipment is involved — small and medium-sized tanks, absorption and centrifugal machines; cooling towers, plus other systems — A-C has *the* pump. Capacities to 3200 gpm, heads to 400 feet.

For the pumps you need, contact your A-C representative, distributor or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-5635

THERMO-FILM* the "HOTTEST" SAFETY FUEL OIL HEATER on the market

- Hundreds of trouble-free installations. Accepted and specified in **all** oil burning areas in the country.
- New Paracoil design . . . oil in the shell, boiler water in the tubes, separated by safety fluid . . . means positive boiler protection!
- The most effective heater of its kind available today!
- Install it and forget it!

Paracoil Safety-Barrier Fuel Oil Heater

This Paracoil Heater solves every one of the Consulting Engineer's and Contractor's problems. Compact. Light weight. No electric wiring, relays or vents. This means lowest installation cost.

Straight tube construction, 100% counterflow, extended tube surfaces and internal turbulence give highest heat transfer rate, hottest oil, with low pressure drop.

A Paracoil Thermo-Film will always deliver oil at the temperature you need at the capacity you require. It is available in standard sizes for immediate installation.

Approved by Board of Standards and Appeals, City of New York. Cal. No. 321-55SA

Write for Bulletin 60-N ***Davis Makes It — Better!***

DAVIS ENGINEERING CORPORATION

30 Rockefeller Plaza, New York 20, New York · Circle 6-5650

*Trademark/Patent Pending

The most complete line of FUEL OIL HEATERS available to the industry

U-TUBE TYPE

for sub-water-line or steam

A 6-pass design for discharge side of fuel oil pump. A 2-pass design for suction side of fuel oil pump. Steel shell, C.I. oil chamber, and copper alloy tubes bent U-shape. Compact for concentrated heating capacities.

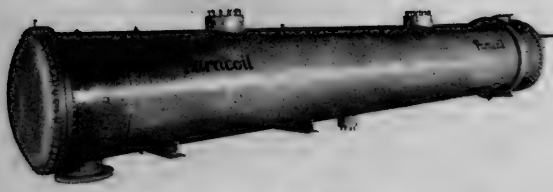
Write for Bulletin No. 60-A

TUBULAR TYPE

for use with high pressure steam

Baffled cross-flow of oil stream on outside of heating tubes. Remarkably high heat transfer rates with low pressure drops. Maximum capacity with minimum size.

Write for Bulletin No. 60-C

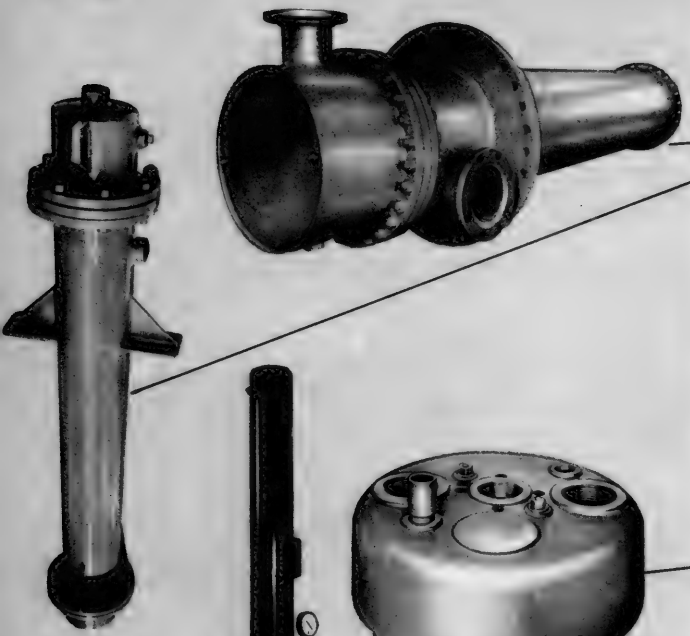


HORIZONTAL STRAIGHT TUBE TYPE

a basic design built in many sizes and capacities for low and high pressure oil systems

Paracoil straight type designed for large capacity installations — permits quick access to tube ends without disturbing either oil or steam connections. Use of Paracoil split shell expansion joint in right end of shell is characteristic of careful engineering design built into all Paracoil exchangers.

Write for Bulletin No. 60-Y



HORIZONTAL AND VERTICAL TANK SUCTION TYPE

for increasing fluidity of high viscosity oils and easing their removal from storage tanks

The horizontal type comes equipped with a shell bolting flange for mounting onto a tank nozzle. Also shown is an in-board flange to receive a shut-off valve, the closing of which permits the removal of the entire heater tube bundle even with a full tank.

The vertical type heater is introduced vertically into the tank through a shell manhole. Its horizontal shell brackets support it on the manhole frame.

Write for Bulletin No. 60-J

TANK SUCTION BELL TYPE

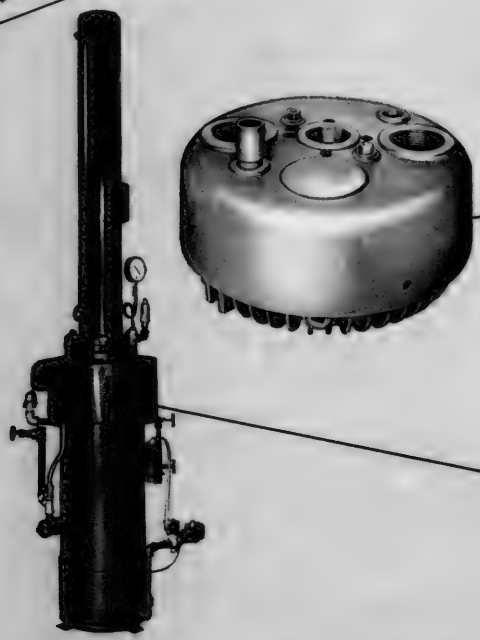
for the effective heating of tank-stored No. 6 fuel oil

Reduces viscosity of oil to facilitate ease of pumping from tank to oil burner.

Easily installed through standard 16" or larger manhole cover. Utilizes excess heated oil, steam, or hot water under forced circulation.

Perfect for the smaller one or two burner installations.

Write for Bulletin No. 60-H



INDIRECT GAS-FIRED FUEL OIL TYPE

maintains oil circuit temperatures during periodic main boiler plant shut-down

protects main boiler plant against oil leak contamination

A self-contained package unit combining a highly efficient gas-fired **Steam Vapor Generator** and a high heat transfer **tubular type fuel oil heater.**

Write for Bulletin No. 60-I

DAVIS ENGINEERING CORPORATION
30 Rockefeller Plaza, New York 20, New York • Circle 6-5650

Marley proudly presents the

PERMATOWER

Engineered in the light of modern technology, PERMATOWERS are a new approach to cooling tower durability under any service conditions. To combat corrosive influences of all types, their design extends the use of reinforced polyester, phenolic and Kralastic type resins and protected laminates to many heretofore vulnerable points.

In a full range of 11 capacity models, PERMA-TOWERS will soon be presented to the market by Marley sales engineers and distributors.

The Marley Company

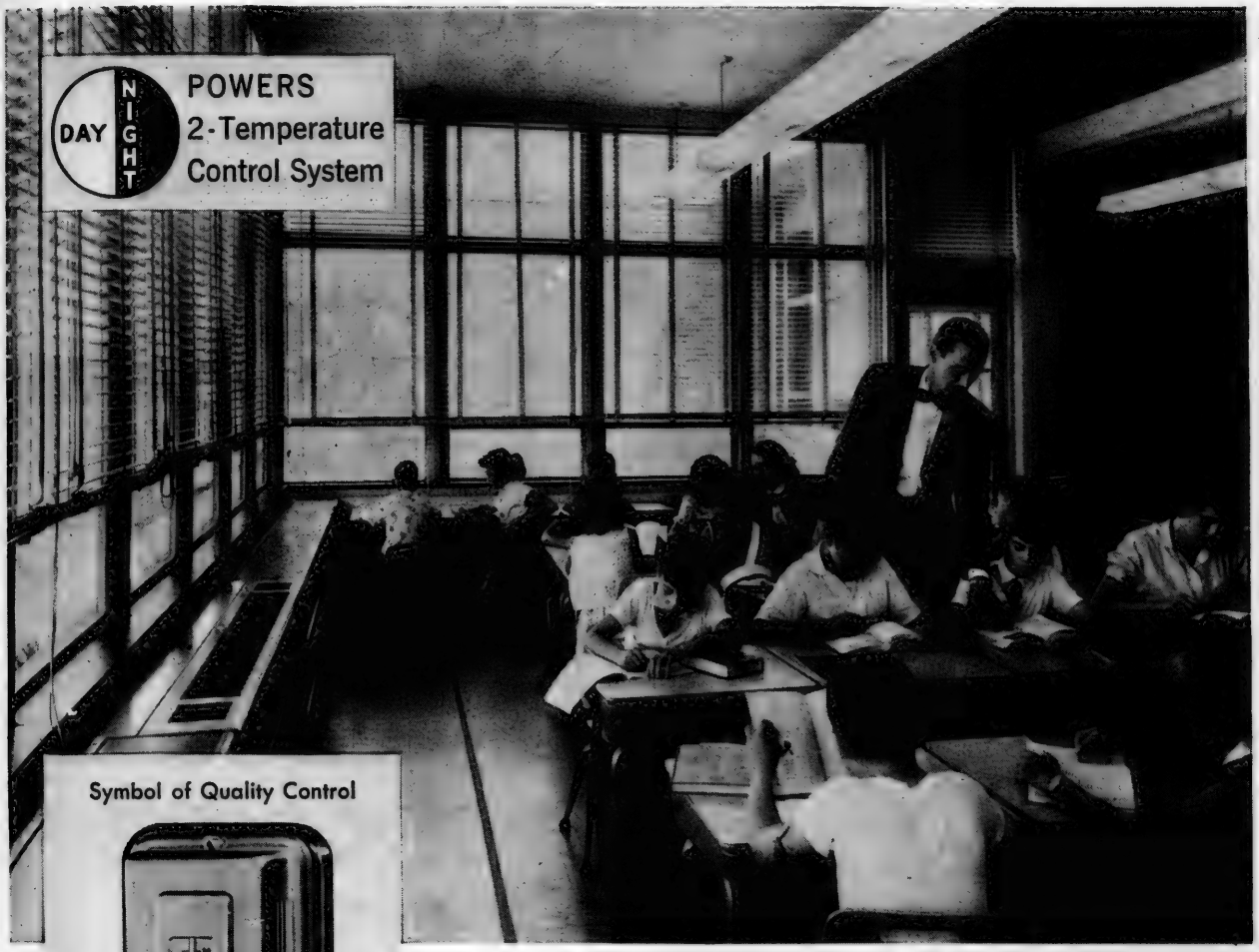
Kansas City, Missouri

ONLY JENN-AIR EXHAUSTERS OFFER TRUE LOW CONTOUR

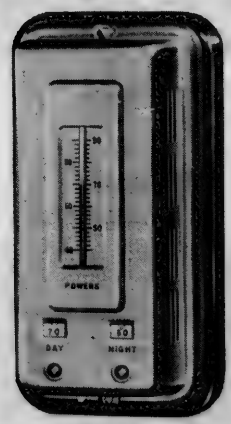
The Big Difference is in the Installed Height

To conform with modern construction, low contour in exhausters is the accepted design among architects, engineers and building owners. And Jenn-Air, first to develop low contour spun aluminum exhausters, still engineers the lowest contour of all. Only true measurement of exhauster height is the distance from the roof level to the top of the exhauster. Jenn-Air Quiet-Tested units, when installed, stand 25 to 50% lower than others—yet meet specifications for a discharge height at least 16″ above roof level. This is achieved by Jenn-Air's exclusive method of nesting the motor below the discharge of the exhauster. Thus, the base of the exhauster itself supplies the additional height. In competitive models, with a discharge height of only 9½″, the curb base must be extended higher to attain the 16″ position. Result: overall, installed height of competitive so-called "low contour" exhausters runs 8″ to 10″ more than that of Jenn-Air. Have a Jenn-Air representative show you the "yard-stick test" . . . proof positive that only Jenn-Air Quiet-Tested exhausters offer *true* low contour.

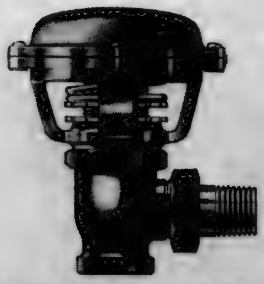
JENN-AIR PRODUCTS COMPANY, INC.
1102 Stadium Drive, Indianapolis 7, Indiana



Symbol of Quality Control



Powers DAY-NIGHT Thermostats accurately maintain set temperatures. They need no frequent checking or readjustment.



Powers PACKLESS Control Valves are labor savers. They prevent water leakage, banish packing maintenance and give better control due to reduced valve stem friction.

Fuel Savings alone pay back its cost

plus COMFORT for Teachers and Students

POWERS Quality DAY-NIGHT System of TEMPERATURE CONTROL

Good School Planning now includes Powers DAY-NIGHT Thermostats. They stop fuel losses due to wasted heat in unoccupied rooms and prevent OVER-heating in occupied rooms. Each Thermostat is adjustable for normal temperatures during occupancy and lower economical temperatures during unoccupied periods.

Low Cost Maintenance—Simplicity and reliable year after year operation with little attention, is characteristic of Powers Control. Each installation is individually engineered to give top-quality performance.

Prompt Service—if required, by skilled Powers engineers and mechanics.

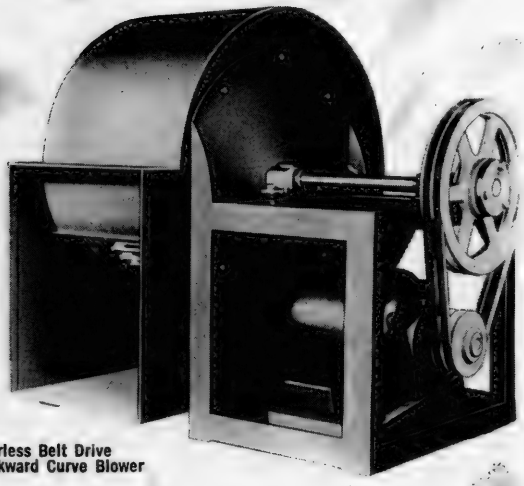
Planning a New School? To get the biggest return on the investment in the heating and ventilating system ask your architect or engineer to include a Powers DAY-NIGHT Control System. For further information call our nearest office or write us direct.

(c66)

THE POWERS REGULATOR COMPANY

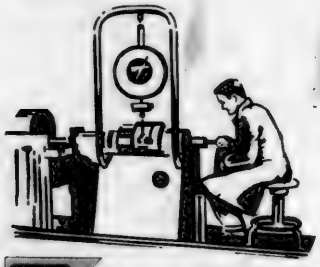
SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A. and Canada*

65 years of Automatic Temperature and Humidity Control



Peerless Belt Drive
Backward Curve Blower

Peerless Belt Drive
Centrifugal Roof Ventilator



TESTED... AND RATED TO AMCA* SPECIFICATIONS

*The new Air Moving and Conditioning Association formed by merging PFMA, NAFM and IUHA.

As a charter member of AMCA, we are naturally vitally interested in listing and rating our air moving products according to AMCA specifications as set forth in the AMCA code. The products you see here are the two most important, basic products in our expanded line of air moving equipment. Along with other Peerless air moving units, they have been designed and manufactured to meet all AMCA standards. With this assurance, Peerless air moving equipment can be specified and installed with confidence. When you have an air moving condition which needs solving, call your nearby Peerless representative or the Peerless factory direct. We can all work together in helping you arrive at the best possible solution.

Write today for Bulletins SDA-160, SDA-200 and SDA-220!

A COMPLETE LINE OF AIR MOVING EQUIPMENT

Charter Member of the Air Moving and Conditioning Association, Inc. (AMCA)

Peerless Electric

FAN AND BLOWER DIVISION

THE Peerless Electric® COMPANY

1400 W. MARKET ST. • WARREN, OHIO

FANS • BLOWERS • ELECTRIC MOTORS

SEE OUR CATALOG IN SWEET'S

Big duct, big saving with ULTRALITE Insulation*

There's a big saving in heat loss (or heat gain) due to ULTRALITE's superior thermal efficiency. There's a big saving in application cost, too, because blanket rolls of ULTRALITE glass fiber insulation wrap quickly around ducts of every size and shape . . . and because ULTRALITE's long-fiber strength makes it easy to secure in place by methods not practical with ordinary glass fiber blankets.

Easy application and low applied cost are also highlights of ULTRALITE Duct Liner, an outstanding acoustical product specifically designed to silence duct noise. Both ULTRALITE Duct Insulation and Duct Liner are available through a nationwide network of distributors.

Call your local G-B distributor listed in the Yellow Pages in 73 cities.

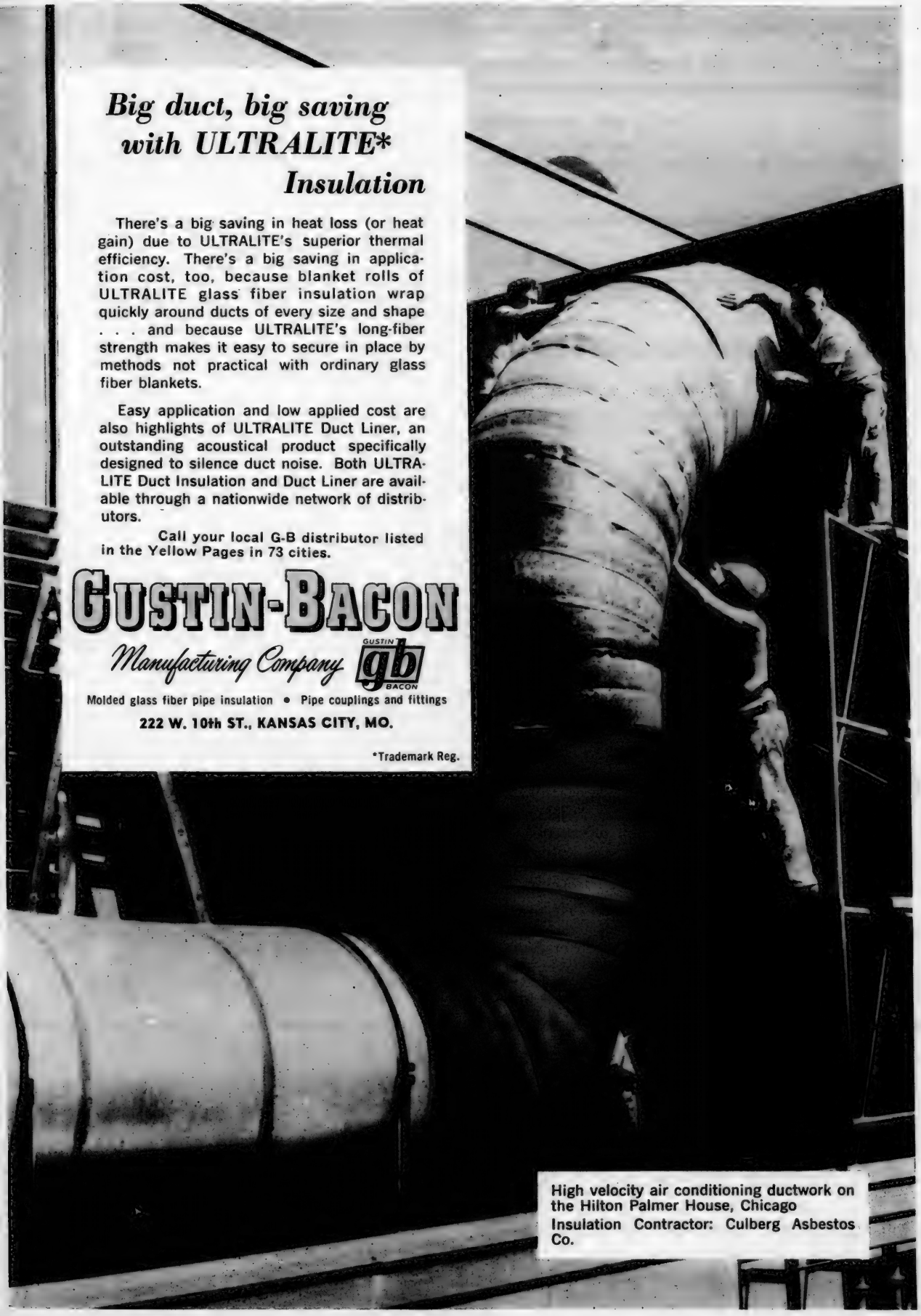
GUSTIN-BACON

Manufacturing Company GUSTIN gb BACON

Molded glass fiber pipe insulation • Pipe couplings and fittings

222 W. 10th ST., KANSAS CITY, MO.

*Trademark Reg.



High velocity air conditioning ductwork on the Hilton Palmer House, Chicago
Insulation Contractor: Culberg Asbestos Co.

SUCTION OIL HEATERS

Compact, economical heaters. For use instead of pipe coils in bottom of tank. Only oil to be pumped is heated. Furnished with nozzle for welding to tank or with flange for bolting.

FUEL OIL PREHEATERS

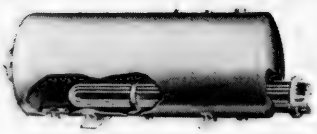
Heating of fuel oil prepares it properly for complete combustion in the burner. Work done by a good preheater, such as ADSCO Type "P", permits the use of heavier grade, less costly fuel oil.

INSTANTANEOUS WATER HEATERS

Furnished as either steam tube or water tube type. Of simple U-bend design with removable element. For heating domestic or process water. Also used as a convertor for space heating.

STORAGE WATER HEATERS

Wide choice of tank materials, including non-corrosive metals, or phenolic-resin lined steel. Welded construction in vertical or horizontal types. Removable U-tube element. Built to Code requirements.

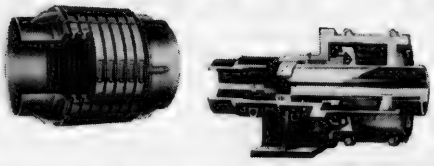


ADSCO

for complete heating and piping service

EXPANSION JOINTS

ADSCO Corruflex Packless Expansion Joints require no maintenance and cost less than pipe bends. Sizes to 54". For pressures to 300 psi and higher, temperatures to 1600F. Various designs for special purposes. ADSCO also makes slip-type joints with long traverses and rigidly guided slips for high and low pressures and temperatures.



PIPE LINE ACCESSORIES

Pipe alignment guides insure straight movement of pipe into expansion joint. Pipe anchors, for underground pipe lines, withstand full thrust of piping.

YUBA

ADSCO DIVISION

20 MILBURN STREET
BUFFALO 12, NEW YORK

YUBA CONSOLIDATED INDUSTRIES, INC.

"Short-radii bends? WEIRKOTE'S® zinc coating thrives on 'em!"

Weirkote's ability to take punishment is a big reason so many fabricators are so enthusiastic about it.

Look at the "S" cleat fabrication at the left, for example. It's about as ornery a job as you can face. Yet Weirkote makes it easy.

You can bead it, crimp it, twist it, draw it, work it to the limits of the steel itself. Doesn't matter what the job or how demanding it is. Weirkote's continuous process integrates the zinc and the steel so that the most complicated forming operations are made without chipping or peeling.

And *now* Weirkote is treated to inhibit wet storage (white oxide) stain. Your finished product has the enduring anti-rust protection you want it to have. You save yourself a lot of rejects, a lot of annoyance. Your costs, from purchase of Weirkote through fabrication, are pleasingly low. Your customers get even more value for their money.

Weirkote may help *you* to make an even better product at an even lower cost. For free 12-page booklet of facts and technical data, write to Weirton Steel Company, Department N-9, Weirton, West Virginia.

WEIRTON STEEL COMPANY

WEIRTON STEEL COMPANY

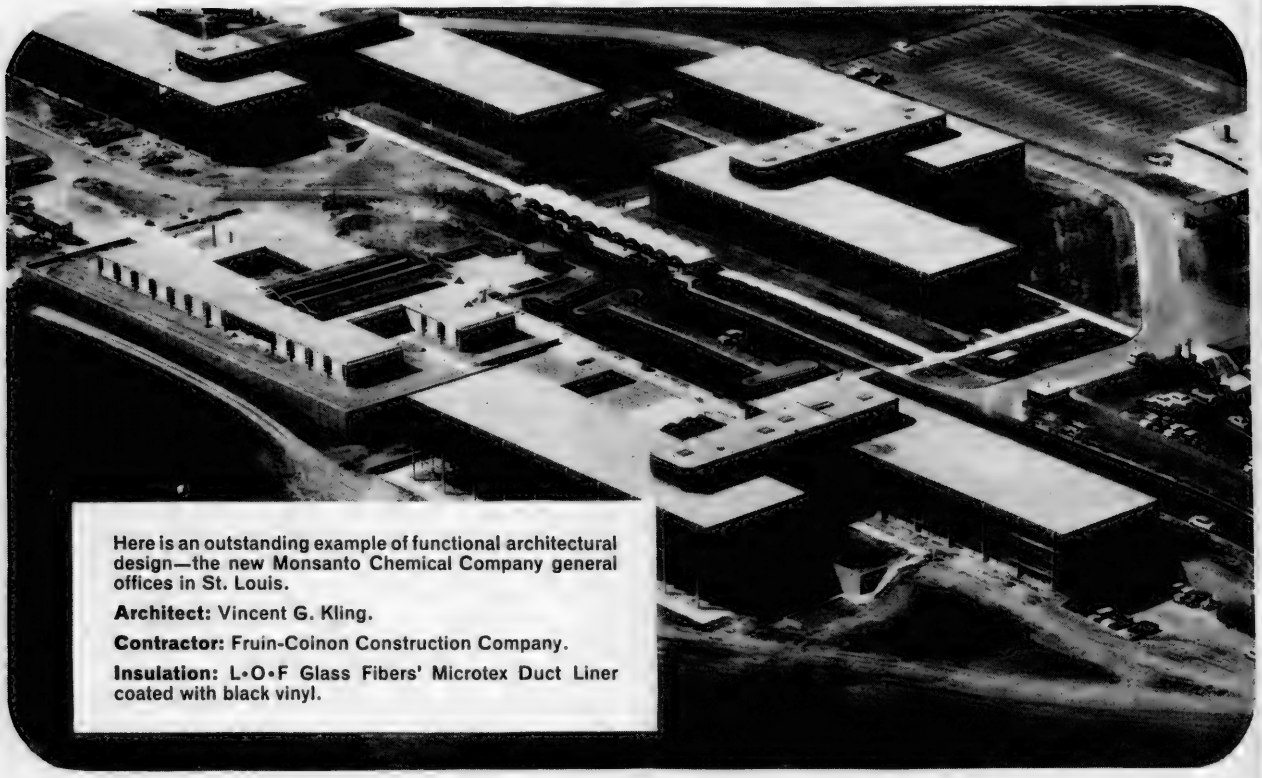
WEIRTON, WEST VIRGINIA

a division of

NATIONAL STEEL CORPORATION

MICROTEX DUCT LINER HELPS PROVIDE HIGH EFFICIENCY IN NEW OFFICE BUILDINGS

Assures better working atmosphere for employees by absorbing fan and motor noises from new high velocity air conditioning system.



Here is an outstanding example of functional architectural design—the new Monsanto Chemical Company general offices in St. Louis.

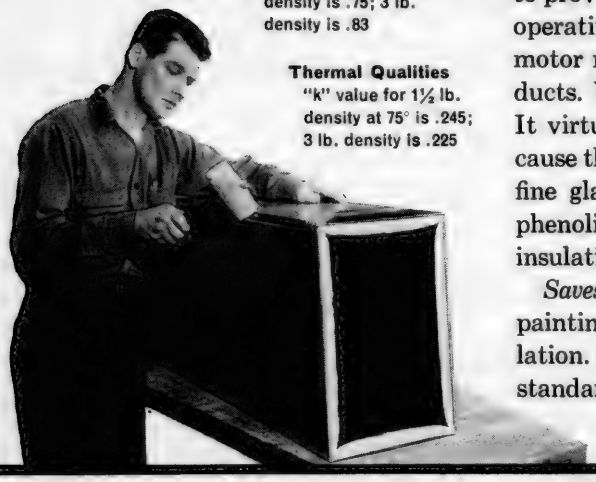
Architect: Vincent G. Kling.

Contractor: Fruin-Colnon Construction Company.

Insulation: L•O•F Glass Fibers' Microtex Duct Liner coated with black vinyl.

Sound Absorption
NRC for 1" liner, 1½ lb. density is .75; 3 lb. density is .83

Thermal Qualities
"k" value for 1½ lb. density at 75° is .245; 3 lb. density is .225



L•O•F Glass Fibers' Microtex Duct Liner was selected to provide the acoustical insulation necessary under peak operating velocities. *Reason:* Microtex absorbs fan and motor noises; soaks-up sounds transmitted through the ducts. Vinyl coating faces airstream: resists air erosion. It virtually eliminates the problem of condensation because the duct itself serves as a vapor barrier. Made from fine glass fibers bonded together with a thermosetting phenolic resin, Microtex is a low density resilient blanket insulation.

Saves Money, too. Ducts lined with Microtex need no painting inside, near grills or large registers, after installation. It is applied quickly without precision work using standard fabrication methods.

See how Microtex Duct Liner can help solve your insulation problems. Call or write the nearest L•O•F Glass Fibers' sales office or distributor.

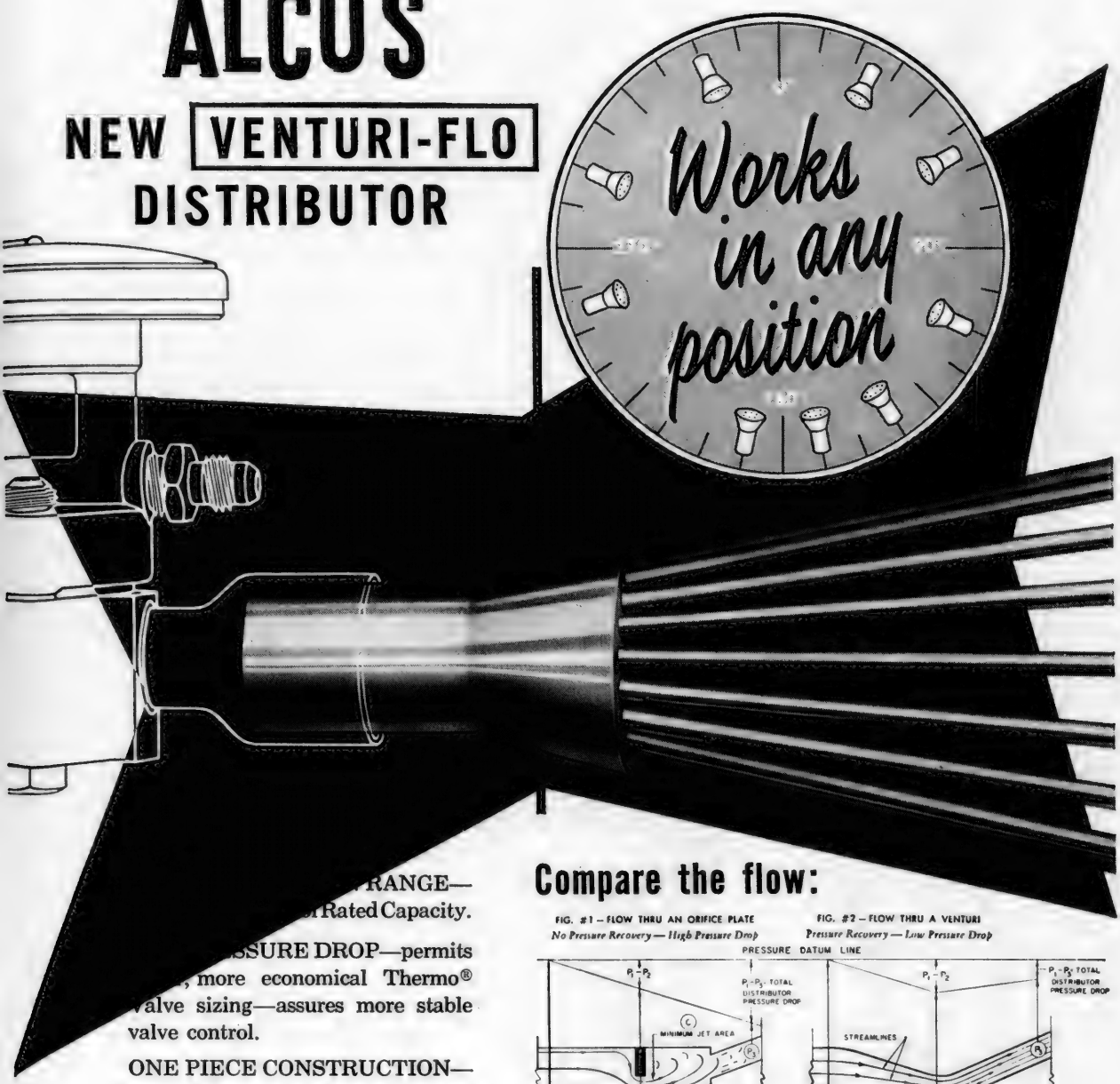
L•O•F GLASS FIBERS

L•O•F GLASS FIBERS COMPANY • TOLEDO 1, OHIO

CHECK THE ADVANTAGES...THEN SPECIFY • INSTALL

ALCO'S

NEW VENTURI-FLO DISTRIBUTOR



RANGE—
Rated Capacity.

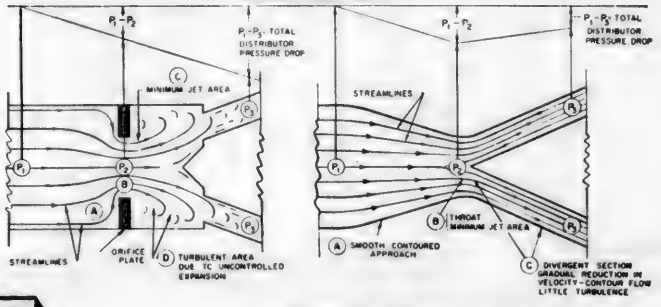
SSURE DROP—permits
, more economical Thermo®
alve sizing—assures more stable
valve control.

ONE PIECE CONSTRUCTION—nothing to come apart, nothing to take apart—*No orifices, plates or nozzles needed* for capacity regulation.

Compare the flow:

FIG. #1 – FLOW THRU AN ORIFICE PLATE
No Pressure Recovery — High Pressure Drop

FIG. #2 – FLOW THRU A VENTURI
Pressure Recovery — Low Pressure Drop


PRESSURE DATUM LINE
$P_1 - P_2$
$P_1 - P_3$ TOTAL DISTRIBUTOR PRESSURE DROP
C MINIMUM JET AREA
STREAMLINES
ORIFICE PLATE
D TURBULENT AREA DUE TO UNCONTROLLED EXPANSION
B THROAT MINIMUM JET AREA
A SMOOTH CONTOURED APPROACH
C DIVERGENT SECTION GRADUAL REDUCTION IN VELOCITY - CONTOUR FLOW LITTLE TURBULENCE

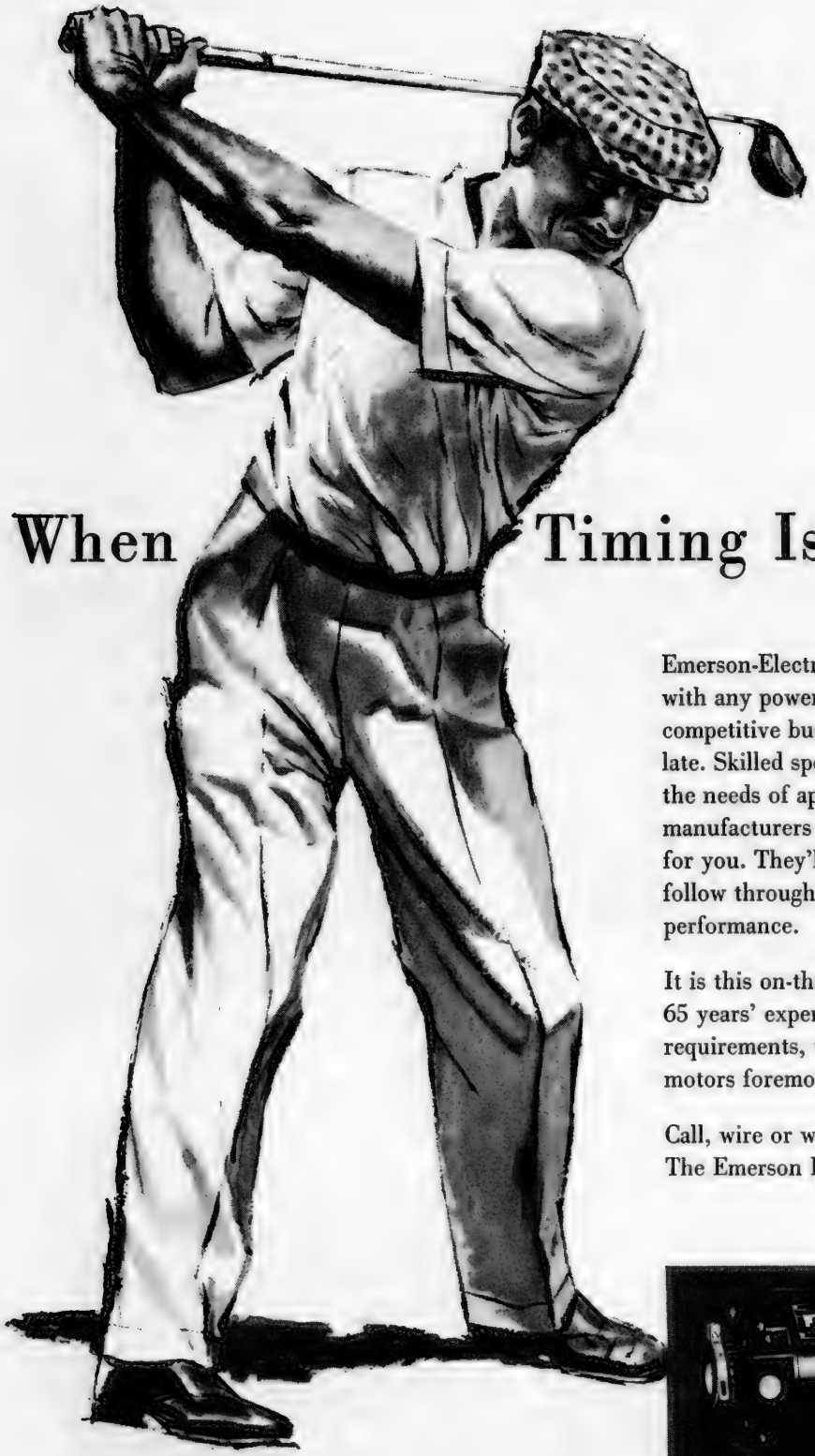
Call your Alco wholesaler—
write for Specifications Bulletin No. 188-57.

ALCO

- *BUY SECURITY*
- *BUY QUALITY*
- *BUY ALCO*

7810

The one complete line of refrigerant controls: Thermostatic Expansion Valves • Refrigerant Distributors Solenoid Valves • Suction Line Regulators • Flooded Evaporator Controls and Reversing Valves

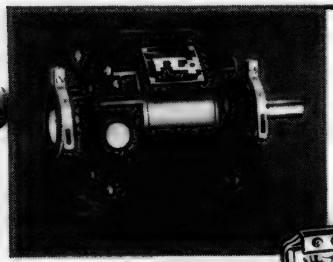


When Timing Is Important

Emerson-Electric is ready to help you *right now* with any power-drive problem. In your highly competitive business, tomorrow can be too late. Skilled specialists who know motors and the needs of appliance and equipment manufacturers are always ready to go to work for you. They'll start with your design ideas—follow through to production and tested performance.

It is this on-the-spot service, plus more than 65 years' experience meeting motor-drive requirements, that have made Emerson-Electric motors foremost in appliance applications.

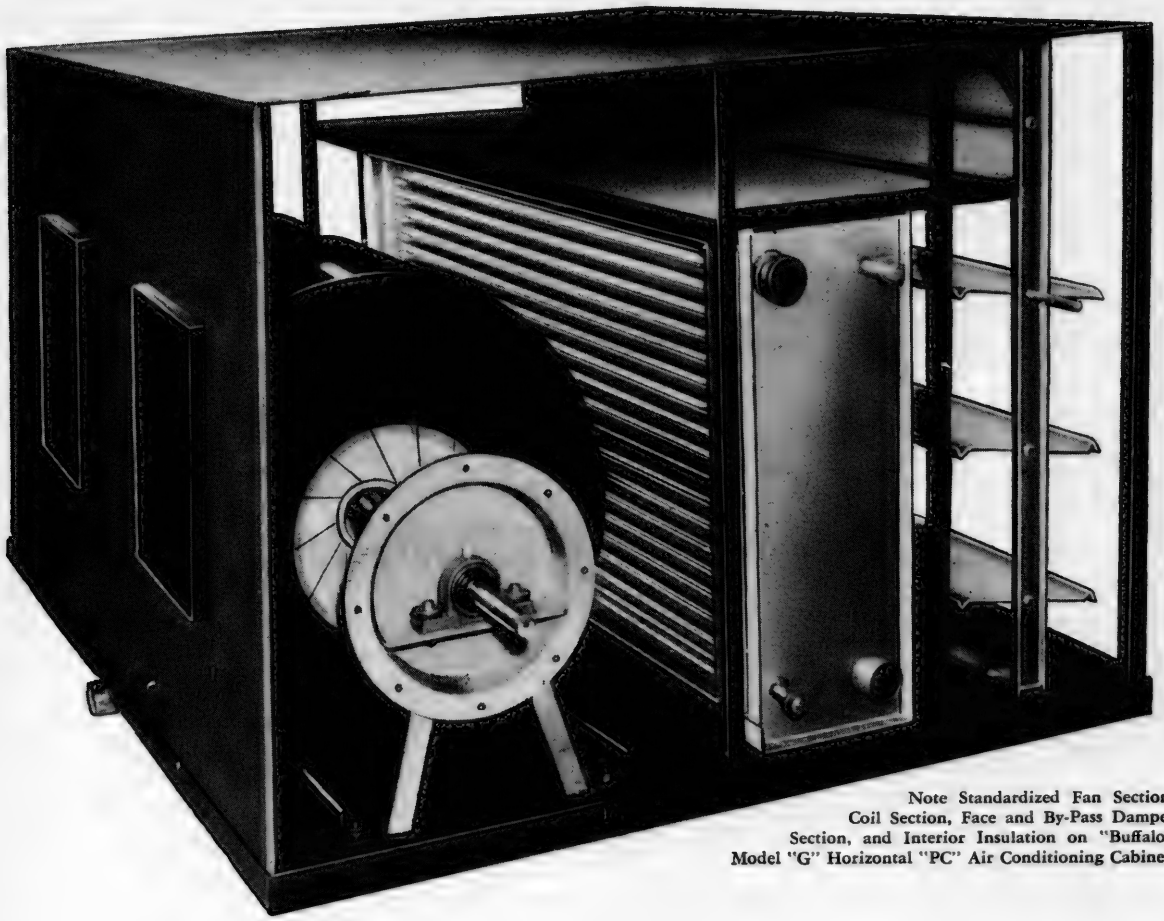
Call, wire or write Dept. M-113 today.
The Emerson Electric Mfg. Co., St. Louis 21, Mo.



Every Emerson-Electric motor is custom-engineered to meet your exact requirements.

EMERSON-ELECTRIC

of St. Louis *Since 1890*



Note Standardized Fan Section, Coil Section, Face and By-Pass Damper Section, and Interior Insulation on "Buffalo" Model "G" Horizontal "PC" Air Conditioning Cabinet.

ARE YOU TAKING ADVANTAGE OF THESE "BUFFALO" AIR CONDITIONING CABINET FEATURES?

1. Easier to Install — simplified knock-down "panel" construction makes the "Buffalo" "PC" Cabinet easier to move through standard building openings than competitive designs.

2. Wide selection of combinations — simple ventilation to complete air conditioning, including cooling and dehumidifying, reheating, tempering, humidifying and air cleaning all year around. All functions including dampers may be automatically controlled.

3. Space-Saving Designs — Choice of horizontal or vertical models, to save productive floor space under the most congested conditions.

4. Complete range of capacities — units available in sizes from 875 to 22,000 cubic feet of conditioned air per minute.

5. Attractive Appearance—Clean-cut, streamlined cabinet design is unobtrusive, presents good appearance.

6. Rugged, reliable, highly efficient — quiet, stable operation over a wide range of capacities and pressures is assured by the specially-designed wheel and blower head. Because these wheels are light-weight, and are mounted on an oversize hollow shaft, high static pressures can be obtained without approaching critical speeds — and with a minimum of vibration. Rigid, sturdy construction insures economical, dependable maintenance-free performance.

These "Q" Factor features of "Buffalo" Central Air Conditioning Cabinets add up to complete satisfaction. The "Q" Factor, of course, is the built-in QUALITY that provides trouble-free satisfaction and long life in every "Buffalo" product. For full information contact your nearest "Buffalo" engineering representative, or write for Bulletin AC-120.

BUFFALO FORGE COMPANY • Buffalo, New York

Buffalo Pumps Division, Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

ONLY

Wing

REVOLVING HEATERS

offer all these advantages

Hot Blasts and Cold Spots Eliminated In Wing Revolving Unit Heaters, the warm air outlet rotates slowly and continuously. This movement of the revolving outlet sets up a gentle air motion which distributes the heat evenly, and eliminates those hot and cold spots caused by stationary heaters.

Because of the constantly changing direction of the warm air, it finds its way around obstructions, such as machinery in manufacturing plants, cars and buses in repair garages, airplanes in hangars, etc.

Fewer Wing Heaters Needed The old concept of unit heaters spaced every 60 or 80 feet doesn't apply with Wing. Wing's largest Revolving Heater, for example, covers over 125′ x 125′.

In a large building this means fewer heaters, much lower installation and maintenance costs. In a building 125′ x 420′, for instance, 4 Wing Revolving Heaters do the job of 12 stationary heaters–without uncomfortable hot blasts or cold spots.

60 Foot Ceilings, And Higher Many thousands of high ceiling Wing Revolving Heaters have been installed where efficiency and comfortable heat are paramount.

Equally Effective with Low Ceilings Wing's line of adjustable discharge outlets provides efficient heating regardless of ceiling height–from 8 feet up.

Low Outlet Temperature Because of Wing's exclusive heating section design, low pressure heating comfort can be obtained with any steam pressure up to 200 psi.

For complete detailed information on Wing's line of Revolving Unit Heaters contact your local Wing Representative or write our Main Office in Linden, N. J.

L. J. Wing Mfg. Co.

DIVISION OF AERO SUPPLY MFG. CO. INC.

140 VREELAND MILLS ROAD, LINDEN, NEW JERSEY

FACTORIES: LINDEN, N. J. AND MONTREAL, CANADA

IN EUROPE: WANSON, HAREN-NORD, BRUSSELS, BELGIUM

OTHER WING PRODUCTS:

- Fresh Air Supply Heaters
- Draft Inducers • Fans
- Turbine and Motor Blowers
- Auxiliary Turbines

WC101

For Ceilings

8 FEET HIGH TO

60 FEET HIGH

AND OVER

FOR CEILINGS

8 FEET TO 21 FEET

FOR CEILINGS

10 FEET TO 27 FEET

FOR CEILINGS

12 FEET TO 60 FEET

AND OVER

You can count on HIGHER PROFITS WITH Curtis AIR CONDITIONERS

Evaporative Condensers and Cooling Towers up to 100 tons
Air handling units to match.

Packaged Liquid Chillers—7½ to 100 tons—F-12 or F-22. With room console units to provide controlled cooling and heating without duct work.

HERE'S WHY...

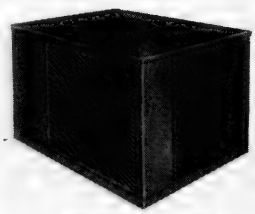
MAXIMUM DEPENDABILITY
Each CURTIS unit is backed by 104 years of engineering and manufacturing experience . . . one of many reasons why CURTIS air conditioning equipment operates at maximum efficiency with a minimum of maintenance.

CUSTOMER SATISFACTION
The long operational life and minimum service requirements of CURTIS air conditioning, combined with peak performance, assures satisfied customers.

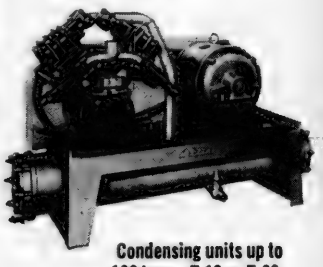
PRE-SOLD PROSPECTS
National advertising beamed at virtually every prospect category helps *pre-sell* Curtis equipment for you. CURTIS provides sales and promotional aids to make your selling job *easier*.

PRICED FOR PROFITS
All Curtis air conditioning equipment is *competitively* priced, with a very generous profit margin *for you!*

Packaged air conditioning units—3 through 50 tons.



Packaged Air Cooled Air Conditioning Units—2 through 7½ tons. Residential and commercial applications.



Condensing units up to 100 tons—F-12 or F-22.

REMEMBER—
you can count on Curtis

OUR 104th YEAR
MANUFACTURING COMPANY • REFRIGERATION DIVISION
1999 Kienlen Ave., St. Louis 20, Mo.

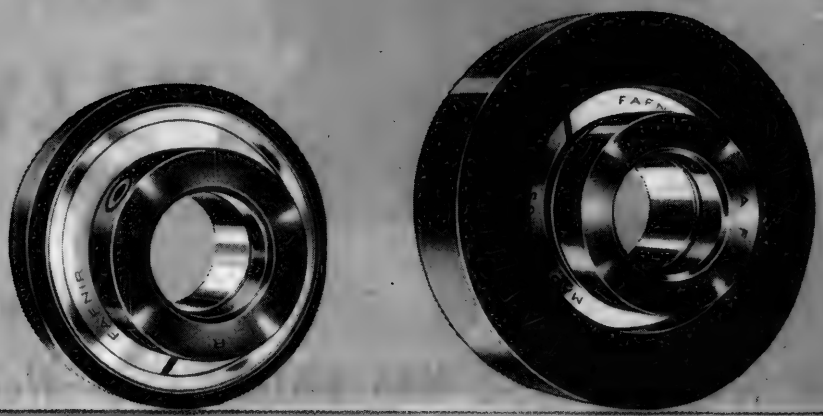
C-35

For simpler design and construction of air conditioning systems . . .

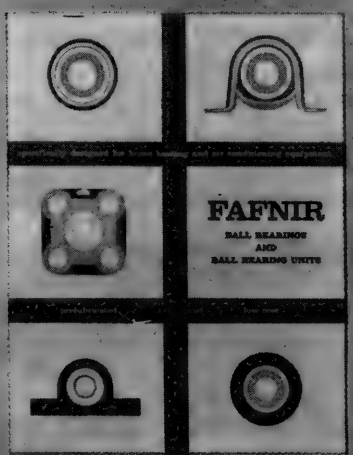
Fafnir

rubber-cushioned

Ball Bearings



NO METALLIC GROUNDING SPRINGS OR CLIPS NEEDED



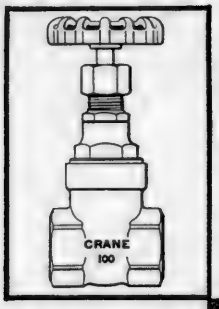
For complete data including dimensions and load ratings, write for the new Fafnir bulletin on air conditioning system ball bearings. The Fafnir Bearing Company, New Britain, Connecticut.

Super-quiet operation isn't the only advantage of the Fafnir Ball Bearing Units designed expressly for air conditioning systems. The grommet that encases each bearing is made of electric current conducting rubber which means: (1) No metallic grounding springs or clips are needed to run off static electricity; (2) A possible source of noise is eliminated.

Here is a typical example of the Fafnir "attitude and aptitude"—a way of looking at bearing problems from the *designer's viewpoint* and the ability to supply the right bearing for the need. It represents one of many FAFNIR FIRSTS in the development of ball bearings and ball bearing units for industry.

FAFNIR
BALL BEARINGS
MOST COMPLETE LINE IN AMERICA

Contractors' Preference for Hot Water Systems



No. 410—100-Pound
Sizes to 2 in.

No. 438—125-Pound
Sizes to 3 in.

No. 437—150-Pound
Sizes to 3 in.

CRANE BRASS GATE VALVES

100-, 125- and 150-Pound Classes Non-Rising Stem—Wedge Disc

Here are today's preferred stop valves for hot water systems. They've earned top recognition for dependability, both under frequent operation and after extended idleness.

In each class they pack a lot of added quality at a competitive price.

For example, Crane cylindrical upper body design gives increased strength and rigidity. It's the same design principle as used for high-pressure steel valves. For a firm, safe wrench grip, Crane gives the hex ends wider than usual faces.

These valves have a deep, screwed-into-the-bonnet stuffing box. Its long contact with the stem gives the stem added support and maintains true alignment. This also reduces wear on packing.

Ask for Circular AD-1944

Get full information on these valves from your Crane Representative the next time he calls. Or write to address below for this circular giving all specification data.

CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

DATA SHEET NO. 2

Short Form Guide to Selecting the Proper

Field TRIPLE-FUEL M+MG2

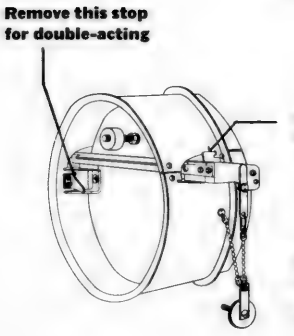
The Field M+MG2 is a triple-fuel control providing equally precise draft regulation for solid fuels, oil, gas, or oil-gas, and requiring only the simplest, on-the-job adjustments when fuels are changed. It is a heavy duty control, in sizes 10″ through 32″.

Remove and file for reference.

APPLICATIONS: Specify for solid fuels, oil, gas or oil-gas furnaces and boilers, with natural, induced or forced draft. In a gas installation, specify the M+MG2 instead of a draft hood in order to give the appliance the assistance of the chimney. Gas installations need a moderately strong draft, and a draft diverter, by its very nature, reduces the draft in breeching or flue to essentially zero.

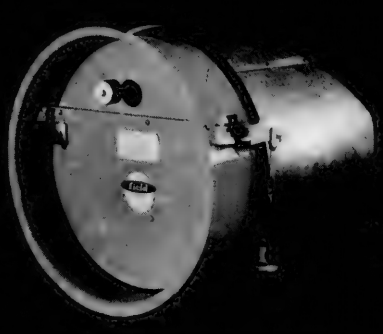
WHAT TO SPECIFY: For oil, gas, or oil-gas, specify the standard M+MG2. It will be shipped as a single-acting oil control. The simple adjustment required for gas will be made during installation. For solid fuels specify the Field M+MG2 Barochek.

CHOOSING SIZE AND LOCATION: See tables and sketches on reverse side. Note that where two or more boilers connect into one chimney a draft control should be installed on each individual branch or uptake, so that different drafts can be maintained at each boiler outlet if necessary.

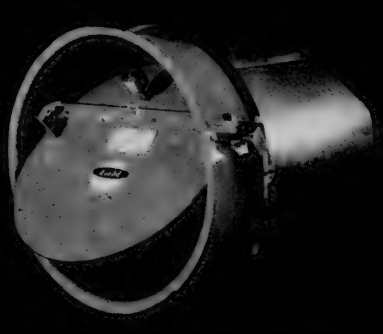


Drawing shows simple stops removed to permit single-acting M+MG2 to become double-acting.

for easy tear-out.



M + MG2 Single Acting for Oil



M + MG2 Double Acting for Gas, opens inward to regulate up drafts, and opens outward to relieve internal pressures.

M + MG2 Barochek for Solid Fuels

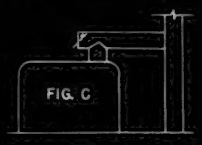
SPECIFICATION DATA — FIELD TRIPLE-FUEL M+MG2

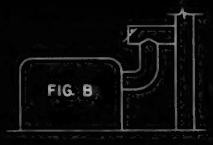
APPROVALS: The M+MG2 is Listed by Underwriters' Laboratories as a single acting control for solid fuels and oil, and as a double-acting control for gas. America's leading gas utilities have approved and are actively recommending the use of Field Draft Controls.

PHYSICAL DIMENSIONS: Dimension drawings and tables for all sizes of the M+MG2 appear on the Field Data Sheet No. 1, in January issues of Heating, Piping & Airconditioning, and Gas Age, and February issues of Airconditioning, Heating & Ventilating, and Gas magazine.

Data Sheet No. 3 will answer the question: "Why Specify a Field Barometric Draft Control for Gas?"

BEST LOCATIONS FOR GAS





BEST LOCATIONS FOR OIL OR SOLID FUELS

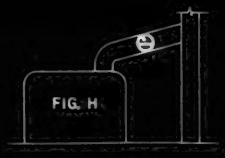


TABLE ONE — GUIDE FOR SELECTING CORRECT SIZE M+MG2 CONTROL FOR OIL-FIRED OR COAL-FIRED PLANTS

DIAMETER OF FLUE or Breeching	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL
12"	20' or less	10"	21—30'	12"	31— 55'	14"
13"	20' or less	12"	21—40'	14"		
14"	20' or less	12"	21—35'	14"	36— 60'	16"
15"	30' or less	14"	31—45'	16"		
16"	25' or less	14"	26—40'	16"	41— 70'	18"
17"	35' or less	16"	36—50'	18"		
18"	30' or less	16"	31—45'	18"	46— 65'	20"
19"	40' or less	18"	41—55'	20"		
20"	35' or less	18"	36—50'	20"	51—100'	24"
21"	40' or less	20"	41—85'	24"		
22"	35' or less	20"	36—70'	24"		
23"	30' or less	20"	31—60'	24"		
24"	30' or less	20"	31—55'	24"	56—100'	28"
25"	50' or less	24"	51—85'	28"		
26"	40' or less	24"	41—75'	28"		
27"	35' or less	24"	36—70'	28"		
28"	35' or less	24"	36—65'	28"	66—100'	32"
29"	55' or less	28"	56—95'	32"		
30"	50' or less	28"	51—85'	32"		
31"	45' or less	28"	46—75'	32"		
32"	40' or less	28"	41—70'	32"		
33"	60' or less	32"				
34"	55' or less	32"				

TABLE TWO — GUIDE FOR SELECTING CORRECT SIZE M+MG2 OR MG1 CONTROL FOR GAS-, OR OIL-GAS FIRED PLANTS

DIAMETER OF FLUE or Breeching	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL	IF CHIMNEY HEIGHT IS	USE THIS SIZE CONTROL
7"			35' or less	8"		
8"			25' or less	8"		
9"	15' or less	8"	16—40'	10"		
10"			30' or less	10"	31— 50'	12"
11"	20' or less	10"	21—42'	12"		
12"	20' or less	10"	21—30'	12"		
13"	22' or less	12"	23—70'	16"		
14"			55' or less	16"		
15"			45' or less	16"		
16"			40' or less	16"		
17"	35' or less	16"	36—90'	20"		
18"	30' or less	16"	31—75'	20"		
19"			60' or less	20"		
20"			36—50'	20"	51—100'	24
21"	40' or less	20"	41—85'	24"		
22"	35' or less	20"	36—70'	24"		
23"	30' or less	20"	31—60'	24"		
24"	30' or less	20"	31—55'	24"	56—100'	28"
25"	50' or less	24"	51—85'	28"		
26"	40' or less	24"	41—75'	28"		
27"	35' or less	24"	36—70'	28"		
28"	35' or less	24"	36—65'	28"	66—100'	32"
29"	55' or less	28"	56—95'	32"		
30"	50' or less	28"	51—85'	32"		
31"	45' or less	28"	46—75'	32"		
32"	40' or less	28"	41—70'	32"		
33"	60' or less	32"				
34"	55' or less	32"				

Chimney height is measured from floor of boiler room. If **very low draft** must be maintained, use control one size larger. If **very high draft** will be necessary, a control one size smaller may be used.

FIELD CONTROL DIVISION

H. D. Conkey & Company, Mendota, Illinois

AFFILIATES:

Conco Building Products, Inc. • Brick, Tile, Stone — Conco Materials Handling Div. • Cranes, Hoists

Represented in Canada by Ontor Limited, 12 Leswyn Road Toronto 19, Ont., Canada

field

DRYNESS

best reason in the world for specifying

genetron®

SUPER-DRY REFRIGERANTS

In "Genetron" Super-Dry Refrigerants, moisture has been reduced almost to the vanishing point. "Genetron" 12, for example, has less than one-thousandth of one per cent of moisture! And the tight quality "specs" for "Genetrons" are usually *bettered* in production. "Genetron" Super-Dry Refrigerants are available from wholesalers everywhere. So be sure to make your next order—*"Genetron."*

QUICK FACTS on GENETRON Super-Dry Refrigerants

- Guaranteed exceptionally low moisture content.
- Noncorrosive to standard equipment materials, nontoxic, nonflammable, stable, safe.
- Critical and freezing points well outside range of operating uses.
- Solvent action on oil helps prevent solidification or congealing of lubricant; aids in lubrication of equipment; generally miscible with oil.
- Freely interchangeable and may be mixed in any proportions with comparable fluorinated hydrocarbons meeting the same strict refrigerant specifications.
- Available everywhere, from refrigeration wholesalers throughout the country.

GENETRON 11 ORANGE LABEL CCl_3F
Trichloromonofluoromethane

GENETRON 12 WHITE LABEL CCl_2F_2
Dichlorodifluoromethane

GENETRON 22 GREEN LABEL $CHClF_2$
Monochlorodifluoromethane

GENETRON 113 PURPLE LABEL $C_2Cl_3F_3$
Trichlorotrifluoroethane

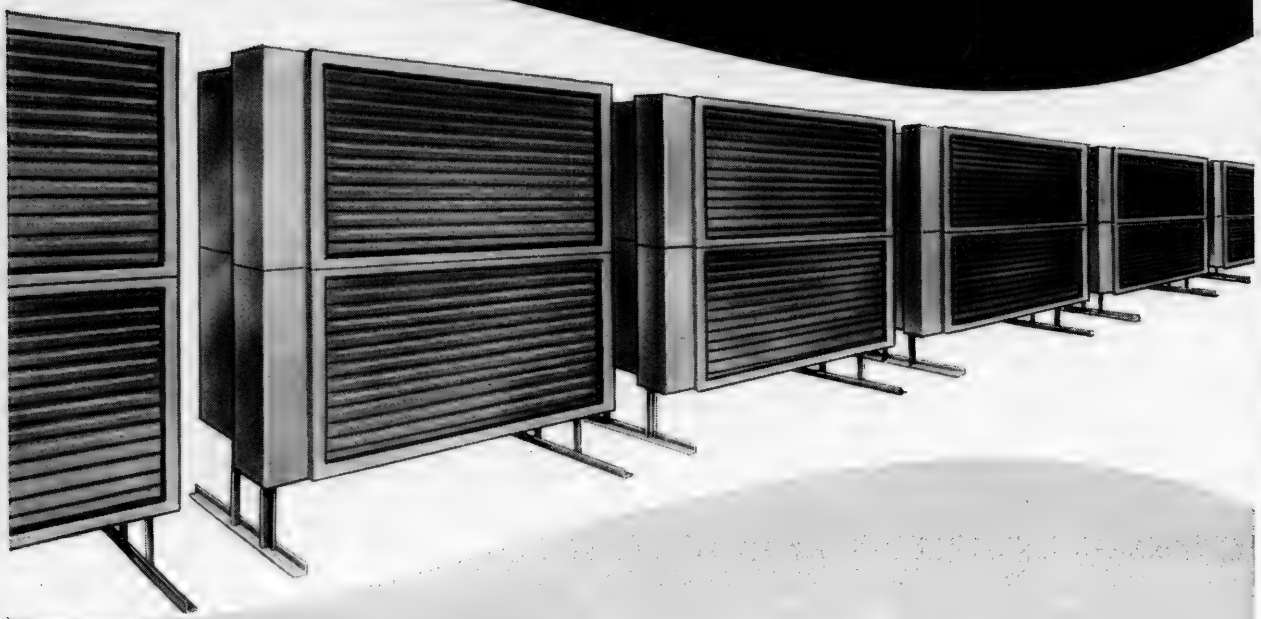
GENETRON 114a BLUE LABEL $C_2Cl_2F_4$
Dichlorotetrafluoroethane

Allied Chemical

GENERAL CHEMICAL DIVISION
40 Rector Street, New York 6, N.Y.

KRAMER

UNICON for UNLIMITED TONNAGE



Kramer Unicon has brought a new era into the industry. With more than 20 years of unique practical experience and know-how in dry condensing, Kramer again offers new avenues of opportunity to the air conditioning and refrigeration industry.

Unicon now has no capacity limit. Standard Unicon systems up to 540 tons are now cataloged for the first time.

Unicons for heat pump applications are now also available with no horsepower limitations.

Kramer engineering and design has proven that the Unicon can move large volumes of air with extreme quietness.

Unicon has long proven by actual experience that it is free from fouling or corrosion and requires practically no maintenance.

The total operating weight per ton for Unicon is very low, resulting in minimum platform and reinforcement requirements.

Unicon space requirements are surprisingly small; a 300 ton system requires only 15′ x 14′ floor space and is 12′ high.

WRITE FOR BULLETIN U-391

KRAMER TRENTON CO. • Trenton 5, N.J.

44 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

"Personally, I always specify Lewin-Mathes Copper Tube"

We welcome stiff-necked specifications.

We meet them . . . because the copper we form into tube is first *refined by us* in our own plant.

We meet them . . . because Lewin-Mathes' *completely integrated operation* permits a standard of quality control—from raw material to packaged tube—that is unsurpassed anywhere in the industry.

As refiners, we know the copper going into Lewin-Mathes Tube is pure. As fabricators, we painstakingly control every physical and chemical property of the finished product. And as *integrated specialists*, we take pride in delivering every foot of Lewin-Mathes Copper Tube uniform and perfect . . . to meet your most exacting requirements.

Nothing primitive about Lewin-Mathes supply facilities. Our products are available through Wholesale Distributors, serviced by Lewin-Mathes Mill Depots throughout 48 states.

LEWIN MATHES
SAINT LOUIS, MISSOURI
COPPER AND BRASS TUBE PIPE AND ROD
DIVISION OF CERRO DE PASCO CORP.

"Bethcon looks good, and does a nice job"

That's what one of our new customers volunteered about Bethcon a few weeks ago. He's no metallurgist, so he couldn't elaborate very much on his statement. But here is the probable reason for his enthusiasm:

Bethcon is galvanized in Bethlehem's up-to-the-minute continuous lines at Sparrows Point, Maryland, which include a continuous annealing process. This treatment gives the steel a very desirable combination of ductility and stiffness, which makes for easy workability and a strong, rigid sheet-metal product.

Bethlehem's continuous galvanizing process also causes the zinc to adhere to the steel much more tightly than the conventional method. You can put a Bethcon sheet through the toughest forming operations—even double it back on itself—without cracking or flaking the coating. The coating itself is more uniform, too, with a uniform thickness across the sheet and no bead on the end.

Bethcon is available in gages 13 and up, in either plain open hearth or copper-bearing steel. A Bethlehem representative will be glad to discuss your sheet metal problems with you. Just call or write to the Bethlehem district office nearest you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

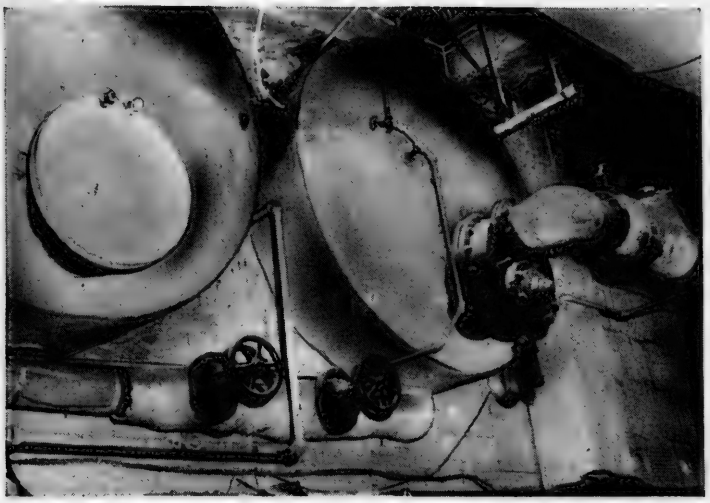
BETHLEHEM STEEL

BETHLEHEM STEEL

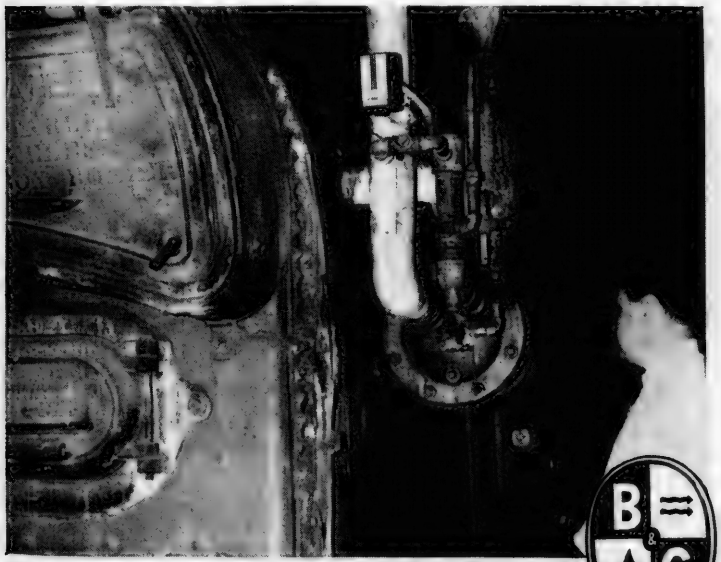
B&G®

"WU" INSTANTANEOUS WATER HEATER

SAVES REPLACING EXPENSIVE HOT WATER STORAGE TANKS



THE PROBLEM: *How to economically replace two leaking hot water tanks.*



THE SOLUTION: *Old tanks were capped off and a compact B&G Type "WU" Instantaneous Water Heater connected to the boiler.*

The photos here show a practical, inexpensive remedy for a common trouble. The "Problem" picture shows two old-fashioned hot water storage tanks, requiring replacement because of leakage...the "Solution" picture, how the tanks were replaced with a modern B&G Instantaneous "WU" Heater.

To remove and replace the two leaking hot water tanks would have been a difficult and costly job. Installing a comparatively tiny B&G Type "WU" Heater *saved hundreds of dollars* and in addition *increased the available volume of hot water!* In 12 years of operation there has never been a shortage of hot water.

Why the B&G "WU" Heater saves space and money

The "WU" comes equipped with a B&G Booster Pump which pumps boiler water through the shell, greatly increasing the capacity of the heater. Large volumes of hot water are produced by amazingly small units.

The Booster is controlled to start whenever water temperature goes below the desired degree. Boiler water is pumped through the shell of the "WU" until service water is again at the correct temperature.

The "WU" Heater can be installed on hot water boilers or below the water line of steam boilers.

Send for this booklet on the application, selection and installation of B&G Instantaneous Water Heaters.

BELL & GOSSETT

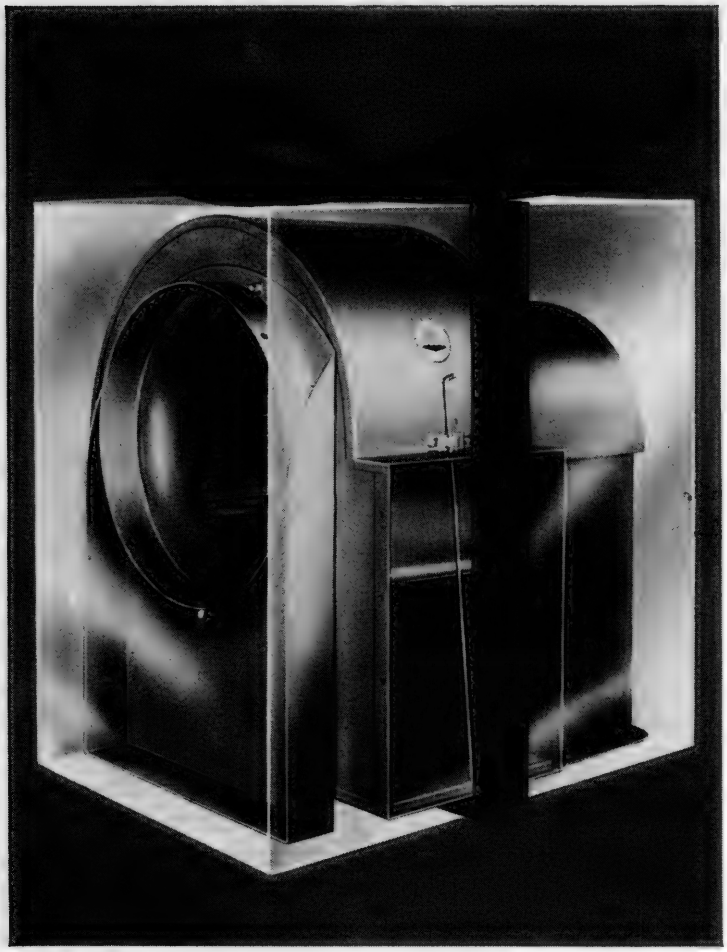
COMPANY

Dept. FF-4, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

*Reg. U.S. Pat. Off.

"PACKAGED" VENTILATION



— another example of how you benefit when you install American Blower ventilating equipment

Sell true, economical "packaged" ventilation—complete and ready to use—in the full line of American Blower Utility Sets.

Self-contained utility sets are assembled at the factory . . . ready for fast, easy installation. And check their other important benefits for your customers:

- **Pre-engineered** — Buyers can compute volume of space to be ventilated . . . just pick proper fan from catalog.
- **Certified Ratings** — Air deliveries meet rigid standard test codes.
- **Available locally** — You give "off-the-shelf" delivery on most models . . . just call the American Blower distributor.

Want *more* profits? Sell the *complete* line of American Blower fans for every ventilating job. Want sales help? Offer your customers equipment selection assistance from one of our 73 branch offices. For full information, write today: American-Standard,* American Blower Division, Detroit 32, Mich. In Canada: Canadian Sirocco products, Windsor, Ontario.

It pays to standardize on American Blower!

Ventura Fans — quiet, efficient, economical. Sizes from 10" to 30".

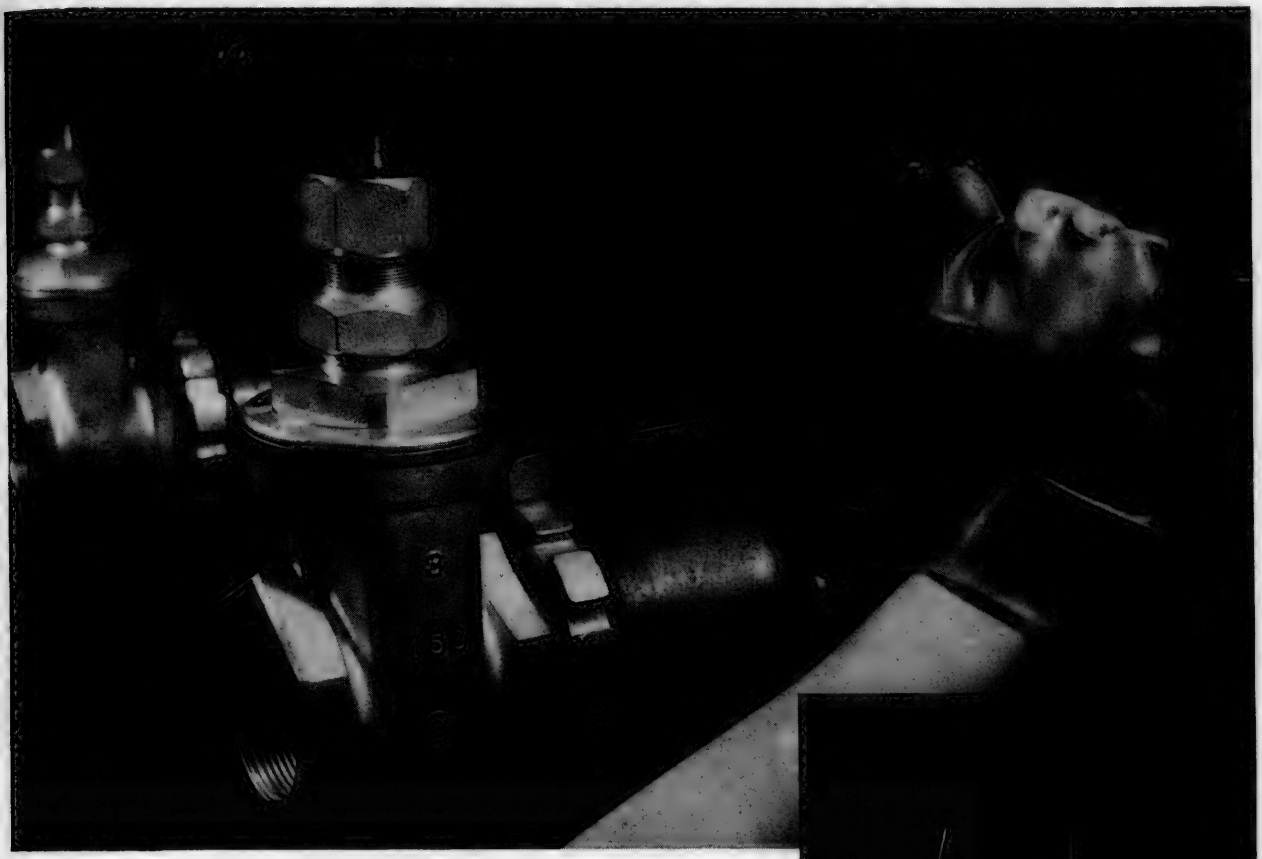
Utility Sets — Direct drive, sizes 3" to 12¼"; V-belt drive, 9" to 36".

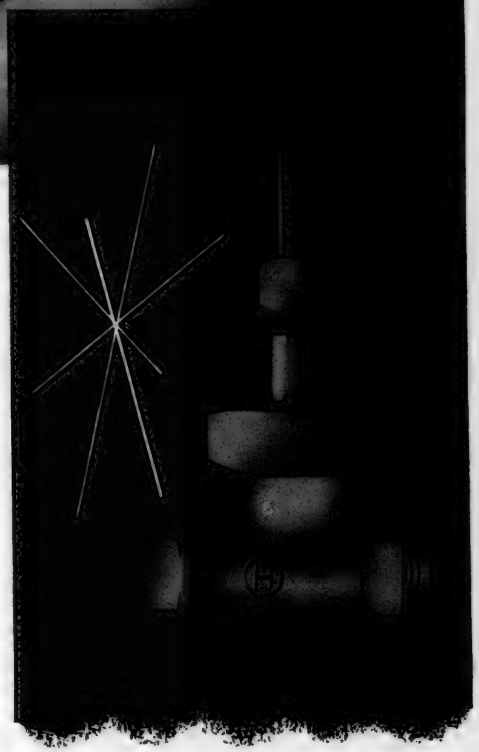
Power Roof Ventilators — available through American Blower branches.

*American-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation.

American-Standard
AMERICAN BLOWER DIVISION

PREMIUM QUALITY—MODERATELY PRICED





Hammond Number 413 globe valve is rated for steam service up to 150 lbs., 300 lbs. W.O.G. Has slip-on composition disc, union bonnet, stuffing box, gland follower. Complies with Federal spec WW-V-51A, Type 1, Class B.

Each valve individually tested

Before it leaves the factory, each Hammond Bronze Valve is individually pressure-tested for perfect closure. For example the Number 619 gate valve above is rated for 150 lbs. Before passing final inspection it must prove drop-tight under an individual hydrostatic test at 300 lbs., as shown. This individual testing is typical of the many rigorous checks and inspections that verify Hammond quality—quality second to none in the valve industry.

Hammond manufactures bronze valves exclusively—and rigorously controls every step from the melting of the virgin ingot to final individual testing. High volume production, in a modern, "automation" factory, permits economies which are reflected in moderate prices for valves of outstanding quality.

Write today for your copy of our new catalog No. 158 describing Hammond's complete line. Address Hammond Brass Works, Hammond, Indiana.

HAMMOND *BRITE-KOTE*® BRONZE VALVES

SHEER ELEGANCE

Made Comfortable By

THERMAL AIR CONDITIONERS

The stylish and highly fashionable Rose Room and Boom Boom Room of Miami Beach's beautiful Hotel Fontainebleau* are maintained in perfect year around comfort with quiet, dependable Thermal Engineering air conditioning units. Fully automatic, the installation maintains pleasing climate, regardless of the size of the crowd.

Thermal Engineering Corporation manufactures a quality line of air conditioning equipment for every type building. The Thermal line includes central plant air conditioners; multizone air conditioners; sprayed coil units; heating and ventilating units; cooling and heating coils and air-cooled condensers. Write for complete information and specifications.

Agents in principal cities.

*Architect:
Morris Lapidus, Miami Beach, Fla.

Air Conditioning Contractors:
Hill York Corporation, Miami, Fla.

Quality Products Since 1945

THERMAL ENGINEERING CORPORATION

2605 W. DALLAS • P. O. BOX 13254
HOUSTON 19, TEXAS

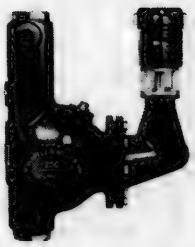
or jobs like these...

Choose from this McDONNELL Line-up

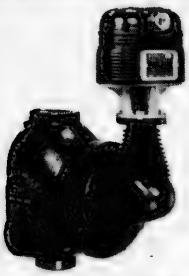
- Boiler Feed Pump Control
- Low Water Fuel Cut-off Switch
- Low Water Alarm Switch
- High Water Alarm Switch
- Electric Valve Control
- High and Low Level Tank Control

No. 92—For any size boilers or tanks with pressures up to 250 psi. Installed with top and bottom equalizing piping. Used on boilers equipped with separate water column.

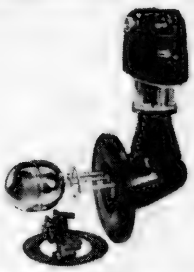
No. 192—For fire-tube boilers with pressures up to 250 psi. Has integral water column for gauge glass and try-cock trim. Holds minimum efficient water level.



No. 292—For water-tube or high set boilers where more visible water in gauge glass is desired. Has integral water column. For pressures to 250 psi.

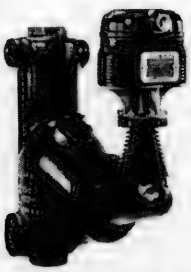


No. 92A—Has lower side equalizing connection. Same features as all 92 Series: operating levels easily adjusted, ample float clearance, low switch terminal temperature, etc.

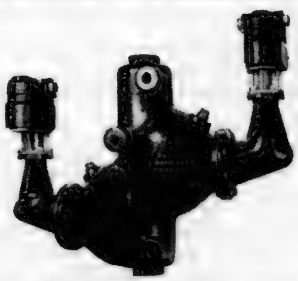


No. 92-HD—For flange mounting on tanks or water columns. For pressures up to 250 psi. No. 91-HD also available for pressures up to 150 psi.

No. 91—For any size boilers or tanks with pressures up to 150 psi. Used on boilers equipped with separate water column. Same repulsion magnetic switching for positive operation.

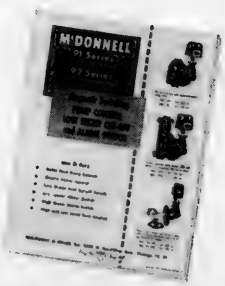


No. 191—For boilers up to 150 psi. Integral water column. All 91 and 92 Series controls have two single-pole double-throw switches. Ideal for motor operated valve control.



No. 291—For applications requiring very wide operating differentials. Pressures to 150 psi. Commonly used with duplex pumping arrangements.

Write for Bulletin L-123



Has the whole story of the McDonnell 92 and 91 Series controls in a boiled-down usable form. Contains service recommendations, installation drawings, wiring diagrams, etc.

Underwriters Listed • C.S.A. Approval No. 5545.

Your Jobber Stocks Them

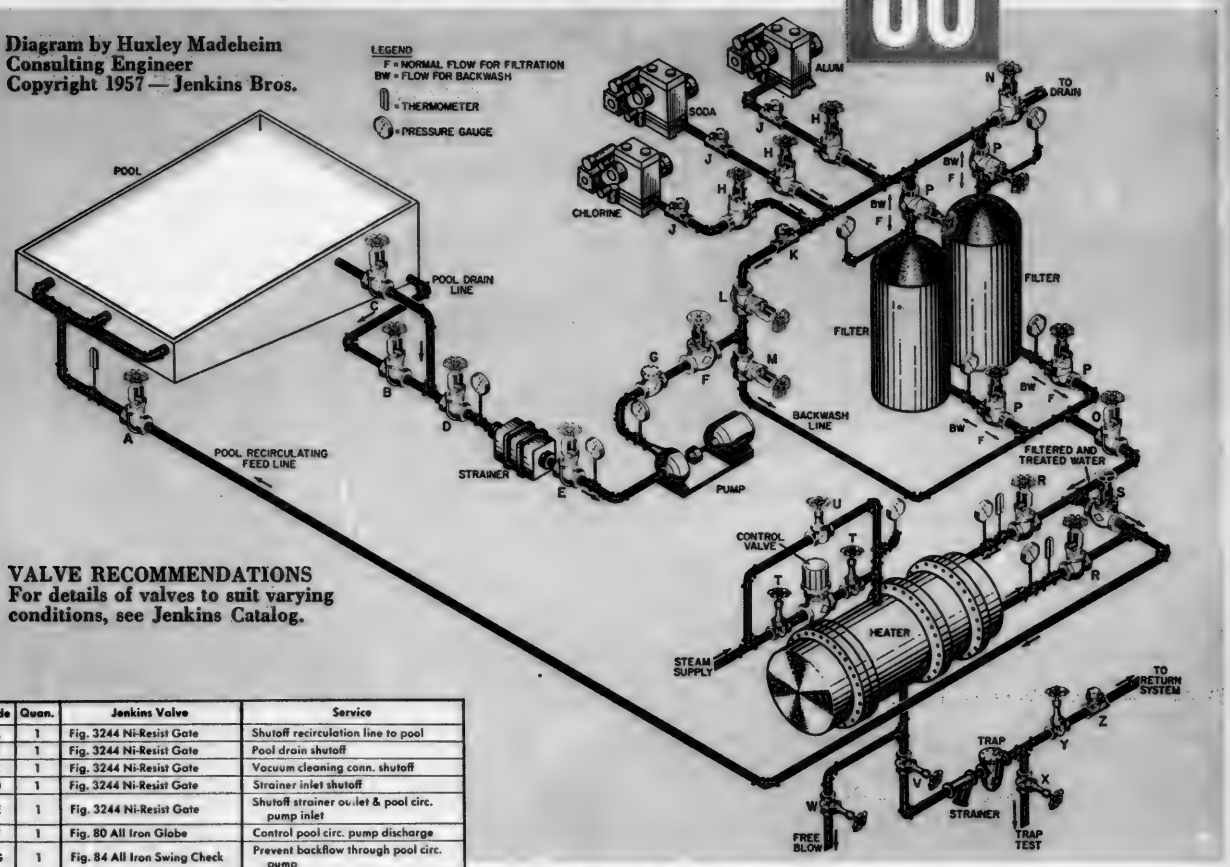
McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18, Illinois

Doing One Thing Well

McDONNELL Boiler Water Level Controls and Safety Devices

JENKINS PRACTICAL PIPING LAYOUTS 80

Diagram by Huxley Madeheim
Consulting Engineer
Copyright 1957 — Jenkins Bros.



VALVE RECOMMENDATIONS
For details of valves to suit varying conditions, see Jenkins Catalog.

Code	Quan.	Jenkins Valve	Service
A	1	Fig. 3244 Ni-Resist Gate	Shutoff recirculation line to pool
B	1	Fig. 3244 Ni-Resist Gate	Pool drain shutoff
C	1	Fig. 3244 Ni-Resist Gate	Vacuum cleaning conn. shutoff
D	1	Fig. 3244 Ni-Resist Gate	Strainer inlet shutoff
E	1	Fig. 3244 Ni-Resist Gate	Shutoff strainer outlet & pool circ. pump inlet
F	1	Fig. 80 All Iron Globe	Control pool circ. pump discharge
G	1	Fig. 84 All Iron Swing Check	Prevent backflow through pool circ. pump
H	3	Fig. 1312 or 1313 S. S. Globe	Control chemical treatment feeders
J	3	Fig. 1328 S. S. Swing Check	Prevent backflow to chem. treatment feeders
K	1	Fig. 1328 S. S. Swing Check	Prevent backflow of chem. treatment to pump & BW line
L*	1	Fig. 3244 Ni-Resist Gate	Shutoff pool flow to filters — Normal filtration
M*	1	Fig. 3244 Ni-Resist Gate	Shutoff pool flow to filters — Backwash cycle
N*	1	Fig. 1312 or 1313 S. S. Globe	Control flow to drain
O*	1	Fig. 3244 Ni-Resist Gate	Shutoff recirc. flow to heater & pool
P	4	Fig. 1302 S. S. Gate	Shutoff filters
R	2	Fig. 3244 Ni-Resist Gate	Shutoff pool water heater
S	1	Fig. 80 All Iron Globe	Control bypass flow about pool water heater
T	2	Fig. 47-U Bronze Gate	Shutoff steam supply control valve to pool water heater
U	1	Fig. 106-A Bronze Globe	Control bypass flow st. supply pool water heater
V	1	Fig. 47-U Bronze Gate	Shutoff steam trap
W	1	Fig. 546-P S. S. and Bronze Globe	Control free flow
X	1	Fig. 546-P S. S. and Bronze Globe	Control steam trap test
Y	1	Fig. 47-U Bronze Gate	Shutoff return system from trap
Z	1	Fig. 92-A Bronze Swing Check	Prevent backflow from return system

	*Normal Cycle Filtration	*Backwash Cycle Filtration
L	OPEN	CLOSED
M	CLOSED	OPEN
N	CLOSED	OPEN
O	OPEN	CLOSED

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
JENKINS
SINCE 1864
Jenkins Bros.
Sold Through Leading Distributors Everywhere

How to plan piping connections

FOR A SWIMMING POOL WATER CIRCUIT

In this swimming pool water circuit, water is drawn off by a pump having a strainer to remove foreign matter. Water is treated with various chemicals to render it slightly alkaline; to kill bacteria and to inhibit growth of algae and coagulated suspended solids. Water is then filtered, warmed and returned to pool through inlets. No make-up water connection is shown because most codes require an independent supply.

In normal operation of the system, valves L and O are open while M and N are closed, which permits water passage through filters and prevents flow to drain. Closing valve R and opening valve S will bypass heater when desired. Steam to heater is controlled by thermostatic valve.

Filter cleaning by "back washing" is done by closing valves L and O, and opening M and N. Water is forced through filters in reverse direction, and discharged to drain. Pool may be emptied by closing valves M and P, and opening L and N.

O. S. & Y. valves are recommended to prevent fluid action on spindle threads. All-Iron and Ni-Resist valves are specified for water circuit, and stainless steel valves where chemicals are encountered. Steam system valves are all-bronze or bronze with stainless steel trim.

Jenkins Fig. 240, and All-Iron, U-Bolt Gate, is used for shut-off control of flow to filters and heater. The solid iron wedge assures drop-tight closure, and the valve can be repacked under full pressure. Jenkins Fig. 1312 or Fig. 1313, Stainless Steel Globe Valves resist corrosion and are recommended for control of chemical and drain flow. The twin bolted bonnet and body design facilitates dismantling for cleaning and regrinding, and is especially suitable where chemicals might destroy conventional body-bonnet threading.

To assure efficiency when planning any major piping installation, consult accredited piping engineers and contractors. For prompt, capable help when you want Jenkins Valves and other supplies, call your local Jenkins Distributor. Jenkins Bros., 100 Park Ave., New York 17.

Specify RECO

RECO craftsman attaches copper lining to steel shell of one of the two storage heaters scheduled for duty at Columbia Hospital

COLUMBIA HOSPITAL—MILWAUKEE, WISC.
Consulting Engineer
Albert H. Myers, Milwaukee
Contractors
A. L. Sauer, Inc., Milwaukee

Operation Hot Water by RECO a success at Columbia Hospital

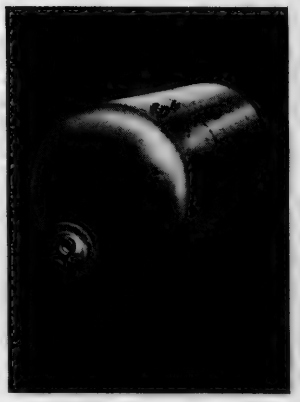
A hospital never lets up on its hot water demands. And RECO never lets Milwaukee's Columbia Hospital down when a hot water call comes through.

Day and night, two copper-lined RECO Hot Water Storage Heaters pour out over 2,000 gallons of rust-free hot water per hour for a hundred different hospital chores.

This kind of top performance is standard for RECO heat exchange equipment. That's why the nation's leading consulting engineers specify RECO for important hot water jobs.

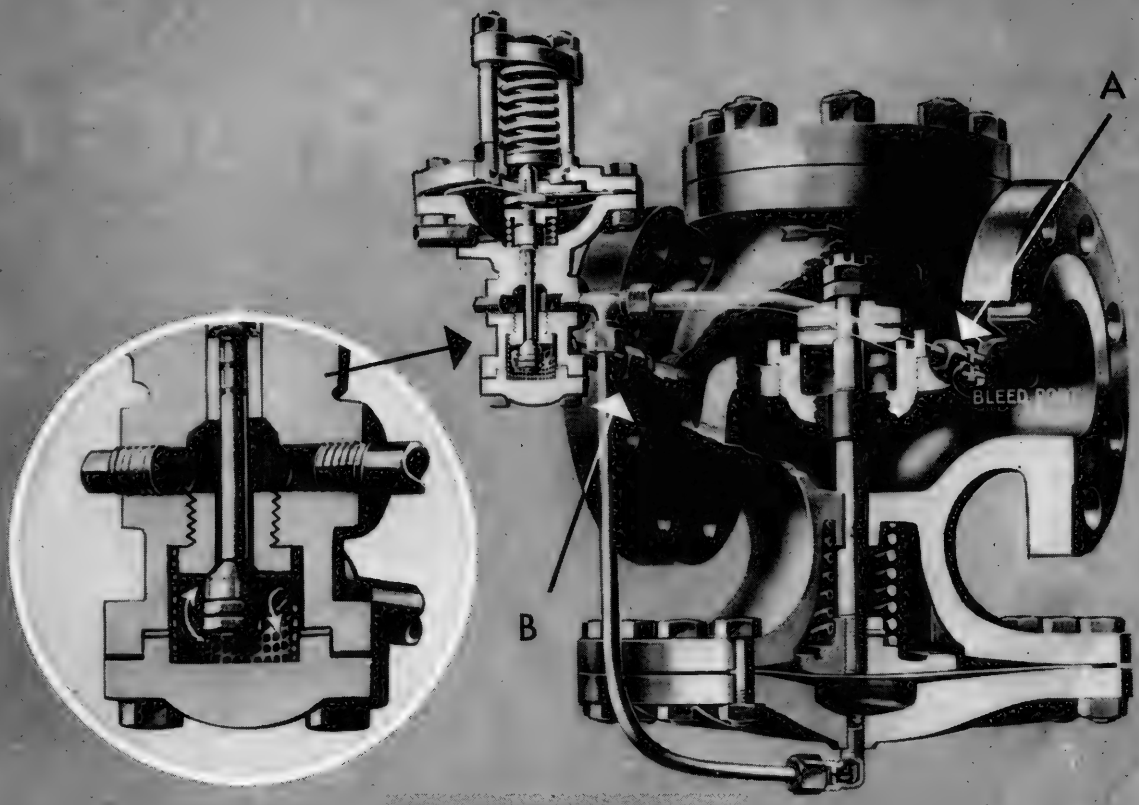
Put the RECO guarantee of *top quality and top performance at the right price* into *your* next specifications. SPECIFY RECO!

For free catalogs plus name of nearest RECO representative, write Dept. Q, RECO, 7th & Hospital Sts., Richmond 5, Va.



RICHMOND ENGINEERING CO., INC.

Advantages of External Pilots in Automatic Regulating Valves



Spence Type ED Pressure Regulator

"Maintenance-free, trouble-free, install-and-forget." They're all pretty phrases, but every engineer knows from experience they don't apply to regulating valves. Any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines.

One advantage of the external pilot mounting shown above is simplified maintenance. Trouble shooting is faster, downtime is reduced, and tempers don't take such a beating. Here's why:

If trouble develops, it's easy to find out if it's in the pilot or the main valve. Just remove the tubing bend at A. A simple test, without any instruments or other equipment, shows where the trouble is.

If the trouble is in the pilot, you can remove it by disconnecting the unions at B. There's no need to take the main valve out of the line.

The quickest way to get the regulator functioning again is to install a spare pilot. This is easy — and in the Spence design it's not expensive to carry spare pilots. Spence pilots fit all sizes of Spence main valves. There's no need to stock an expensive inventory of pilots for each main valve size.

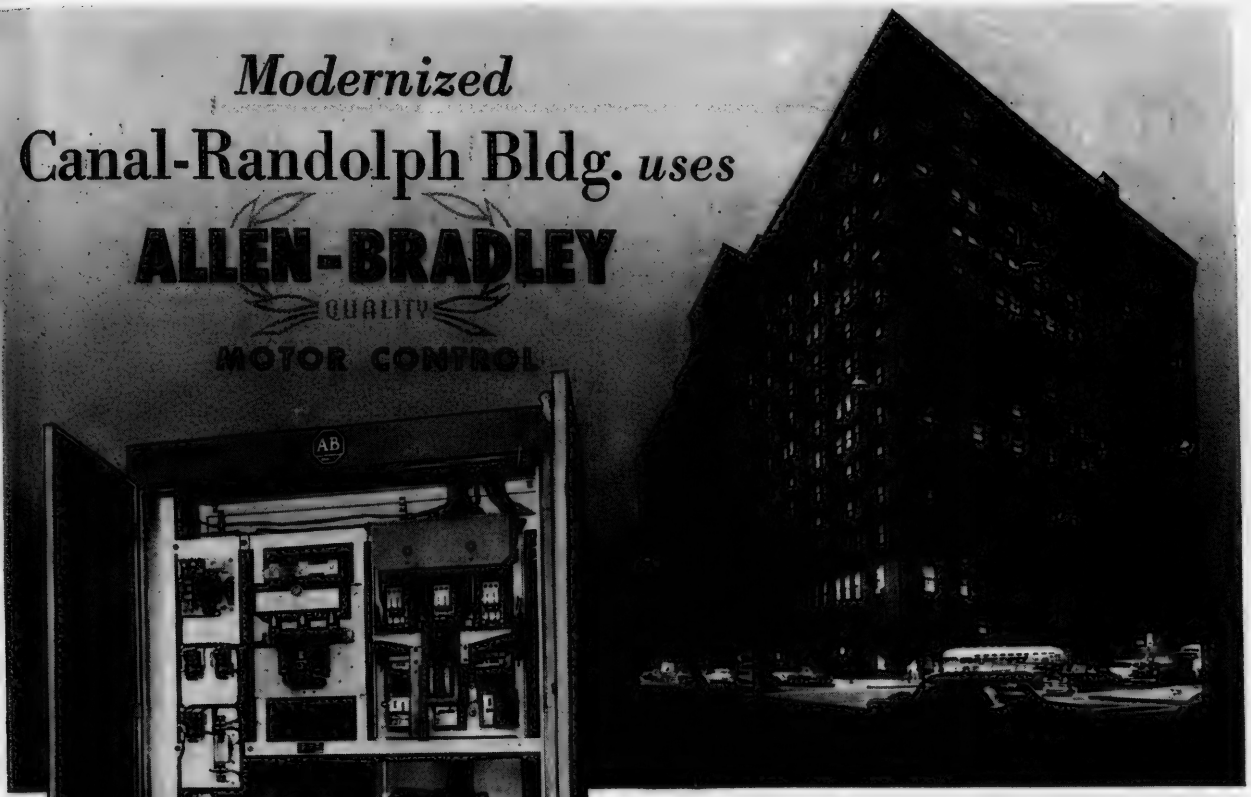
In the enlarged sectional drawing above, you can see how the strainer, seat and disc of the pilot are readily accessible by removing the blind flange.

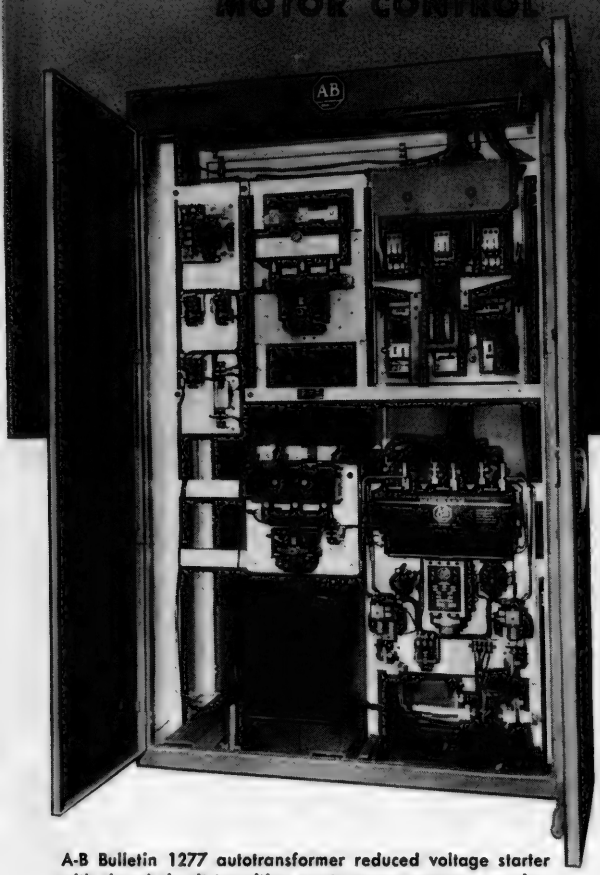
If the trouble is in the main valve, here again inspection is easy. If there's dirt in the steam line, it may clog the bleed port or restriction orifices. In the Spence design these can be inspected and cleaned by merely removing the tubing connections. The seat and disc of the main valve can also be inspected easily by removing the top flange.

These maintenance advantages, plus other advanced design features, are available for a wide range of regulating applications. For information on Spence's wide range of different automatic regulating valves, write for your copy of Bulletin 1005.

SPENCE ENGINEERING COMPANY, INC.
Walden, New York

Modernized
Canal-Randolph Bldg. *uses*
ALLEN-BRADLEY
QUALITY
MOTOR CONTROL





A-B Bulletin 1277 autotransformer reduced voltage starter with closed circuit transition meets power company requirements for acceleration without heavy current surges.

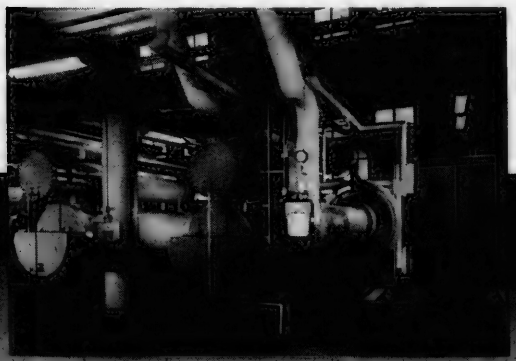
Consulting Engineers: Brooke & Choporis.
Air-Conditioning Contractors: Gallaher & Speck.
Electrical Contractors: Hultgren Electric Corp.
Managing Agent: Hogan and Farwell, Inc.

Where *quality*—not necessarily the lowest price—is the most important requirement, you'll find Allen-Bradley quality motor control in use.

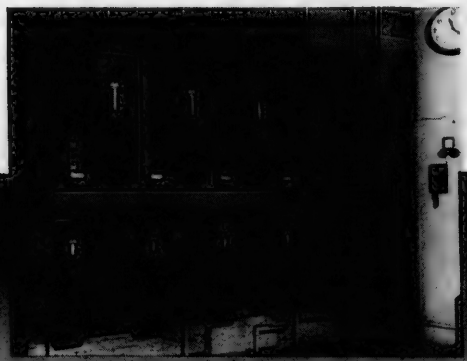
The simple solenoid design—which *only* Allen-Bradley offers in *all* starters up through Size 7—has only *one* moving part. This assures *millions* of trouble free operations. There are no bearings to corrode and stick . . . no flexible jumpers to wear and break. Also, the double break, silver alloy contacts—*standard* throughout Allen-Bradley control—never need maintenance. They are always in perfect operating condition. This is why you can install Allen-Bradley control . . . and forget it.

Be sure to specify Allen-Bradley motor control by name . . . it's a decision you will never regret . . . the A-B trademark is your guarantee of years of reliable, trouble free service.

Allen-Bradley Co., *1330 S. Second St., Milwaukee 4, Wis.*
In Canada—*Allen-Bradley Canada Ltd., Galt, Ont.*



This air-conditioning system uses a total of five Trane units. Each of these 400-ton units is equipped with an A-B Bulletin 1277 starter to operate the 440 v compressor motor.



A-B Bulletin 712 combination starters are used to operate the auxiliary pump motors. These are listed in the A-B Handy Catalog. Send for your copy.

A-B QUALITY

FRICK

AT THE

"CROSSROADS OF THE SOUTH"

New Fulton Federal Building in Atlanta uses Frick Air Conditioning throughout.

Half a block from the famous intersection of Peachtree St. at Five Points, in historic Atlanta, is the new home of the Fulton County Federal Savings & Loan Association.

All planning was directed toward achieving the most modern and distinctive bank-office building in the South. Eight different types of domestic and foreign marble were used in the construction. The entire building is equipped with zoned year-around air conditioning.

Five Frick "ECLIPSE" compressors supply the refrigeration for chilling the water for air conditioning. Four of the compressors in a penthouse handle the cooling of the eight top floors, while the other machine, located in the basement, serves the remaining floors. The entire system is fully automatic. Mr. William M. Scurry, President, states, "Since this Frick system has been installed, it has proved highly satisfactory in every respect."

Architects: Abreau and Robeson, Inc., Atlanta, Georgia.

For that all-important air conditioning, ice making, quick freezing or any other refrigeration work of yours, call the nearest Frick representative. Branch Offices and Distributors are located in principal cities the world over. They have the knowledge and equipment to solve all of your cooling problems.

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

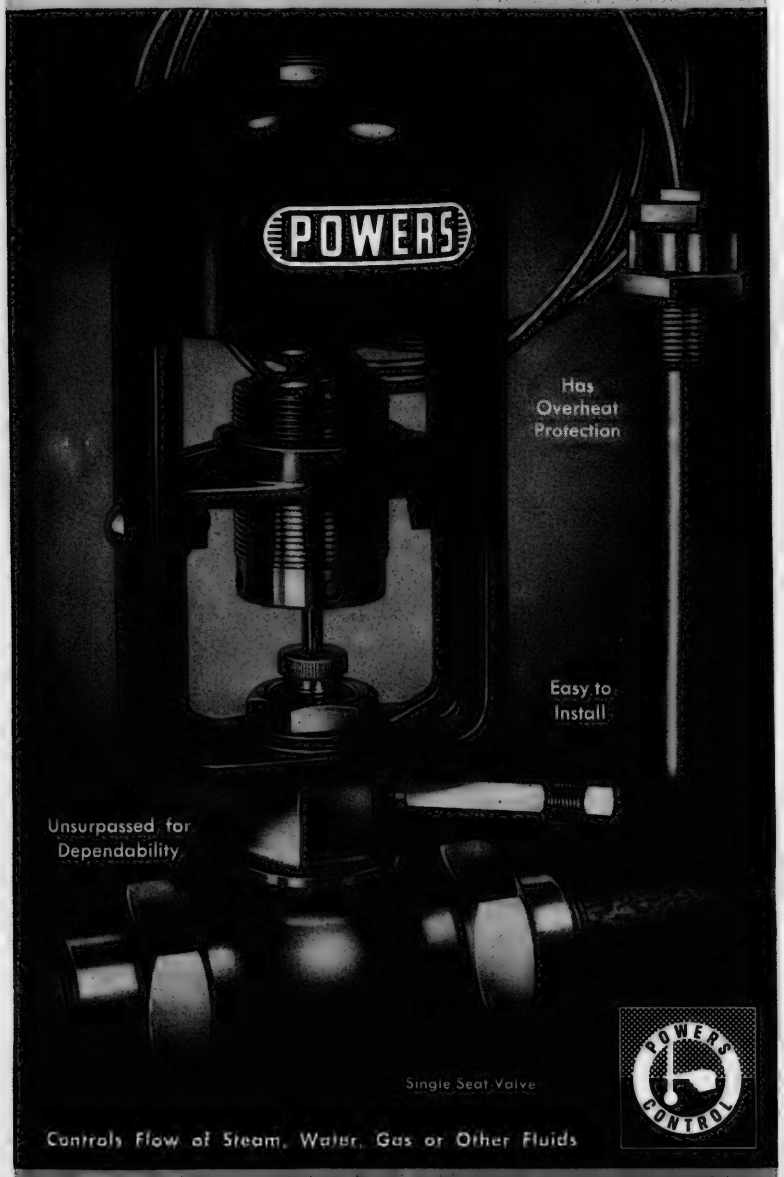
WAYNESBORO, PENNA., U. S. A.

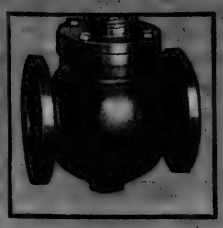
Four Compressors Located in Penthouse

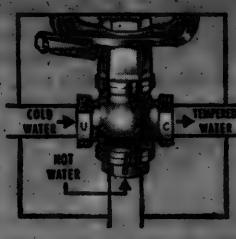
Air Conditioned Banking Room in Fulton Federal Savings

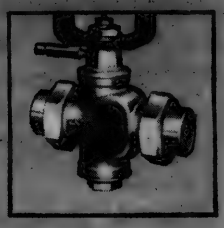
POWERS No. 11 Self-Operating TEMPERATURE REGULATOR

One of Powers many controls. It automatically hold temperature constant at the right point and prevents losses caused by wasteful OVER-heating.





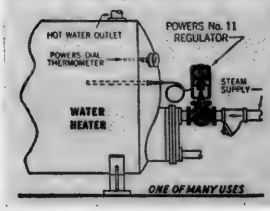




Various Valve Bodies and Inner Valves are available. Single and Double Seat Valves thru 2" have rugged bronze bodies with bronze union connections for quick, easy installation. For further information write for Bulletin 329. (c33r)

Why It Gives BETTER CONTROL and Saves More Money

Often repays its cost 3 to 6 times a year when used on:



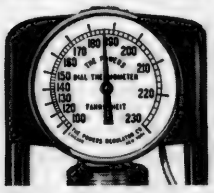
Water Heaters — Industrial Processes — Heat Exchangers — Fuel and Crude Oil Heaters — Air Compressors Diesel Engines

ONLY POWERS No. 11 REGULATOR Offers ALL These Advantages

When you specify or buy a Powers No. 11 Regulator you can be sure that its performance will confirm the wisdom of your choice. Check its Quality Features—

- **Bellows has 50% more power** than used in the majority of regulators. The heart of a self operating regulator is its bellows. Powers with its 50% greater effective area gives better control and its durable 2 ply bellows outlasts ordinary single ply.
- **Powers New 590-LONG-LIFE Valve Packing** marks an important milestone in the reduction of maintenance. It has a low friction factor and outlasts others by a big margin.
- **Valve stem lubricator** with silicone grease aids easy movement of highly polished stainless steel valve stem and reduces drying out of packing.
- **60° F. Temperature ranges.** Control system is sensitive to temperature changes within 1 to 2° F.
- **Durable Construction.** Materials used are corrosion resistant.

No. 11 Temperature Indicating Regulator



has a big easy to read 4" dial thermometer. It gives a quick check of controlled temperature and provides an accurate guide for adjusting regulator.

A feature originated by Powers in 1930.

- **Powers Nationwide Service and 24 Hour Delivery** in the U. S. and Canada are important time and money saving advantages.

If you have a temperature control problem, call your nearest Powers office or write us direct.

- **Use Powers 65 years of experience and engineering know-how** to help you select the right type temperature regulator and right size valve. Both are essential for best control.

THE POWERS REGULATOR CO.

Skokie, Ill. | Offices in 85 Cities in U.S.A. and Canada | See your phone book

Automatic Temperature and Humidity Control Since 1891

THIS NEW VACUUM HEATING PUMP IS SIZED TO ACTUAL JOB REQUIREMENTS

It's the Nash CSM

No longer is it necessary for the Engineer to accept a vacuum heating pump with air and water capacities based inflexibly upon square feet of equivalent direct radiation. With the flexible Nash CSM he can provide for proper air capacity in accordance with his judgment and experience. For the individual capacities of the separate pumps on the CSM may be varied within a wide range, without buying an oversize receiver and oversize water pumps.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low, returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- ✓ Increased air capacity induces rapid system response without wasteful overheating.
- ✓ Separate air and water pumps individually selected to meet actual job requirements.
- ✓ Control system that operates individual pumps only when needed.
- ✓ Flexibility permitting addition of radiation without changing basic pump installation.
- ✓ Low, low, return line connection.

NASH ENGINEERING COMPANY
438 WILSON, SO. NORWALK, CONN.

Engineers who are faced with the design of heating and ventilating systems for hospitals will find considerable helpful information and guidance in this article. Included are basic design data and details of various systems. Part I.

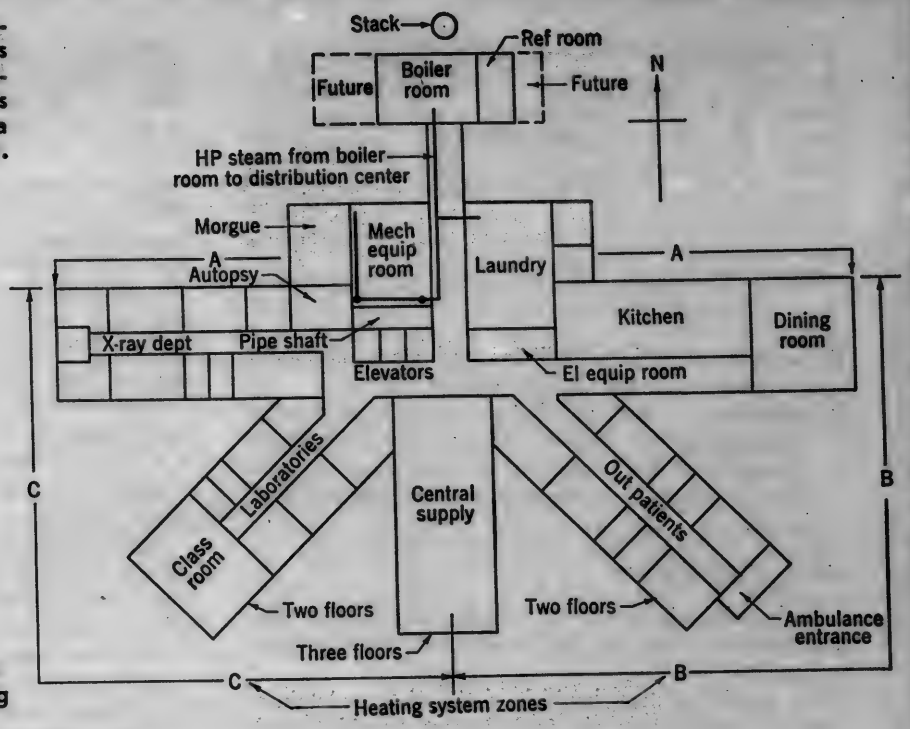


Fig. 1. General arrangement of the ground floor of a hospital showing location of zones.

Heating and Ventilating System Design for Hospitals

J. E. YORK
Consulting Engineer, Harwick, Mass.

BECAUSE heating and ventilating requirements for a modern hospital are complex, they should be carefully considered by the engineer, architect and building committee in the preliminary design stages when a new hospital or extensions to an existing hospital is being developed.

The ideal choice of equipment and its arrangement are rarely possible, as the prime purpose of a hospital is to provide the maximum and best accommodation for patients and hospital personnel. This includes the latest and best medical appliances possible with the funds available.

Funds for the purchase of boilers and other heating and ventilating equipment considered desirable by the engineer, and space for installing such equipment, may, therefore, be insufficient. When the hospital is completed and in service, restrictions imposed on the selection and installation of this equipment will be forgotten, but operating and maintenance difficulties due to saving in first cost, or because equipment is too crowded to permit proper operation and maintenance, will be a continuing source of criticism.

Unfortunately, one frequently expects that after brief review and discussion of a very nebulous set of plans, the engineer should be able to estimate accurately the cost of the work and the space required for equipment installation. Unless the engineer has had the benefit of several recent and similar projects in the same general location, he should insist on being allowed reasonable time to study the project before making any statement.

Should the engineer make any "off the cuff" estimate, he will probably be criticized if his figures exceed that which were expected by the architect and by the building committee.

Preliminary Discussions

During the preliminary meeting it will be advisable to discuss and, if possible, reach an agreement on the following basic items:

1. Type of heating system to be installed.
2. Ventilation requirements and type of system to be provided.
3. What areas, if any, are to be air-conditioned.
4. Will a laundry be included at the present time, or in any anticipated extension?
5. What kitchen equipment will be provided in the main kitchen, and in food stations on the various floors.
6. What sterilizing equipment and water stills will be provided in the central supply and in the wards.
7. Preferred boiler room location, and space for other mechanical and electrical equipment.

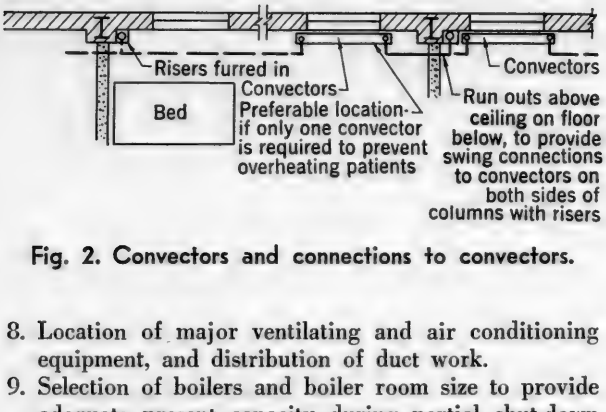

Risers furred in
Convectors
Bed
Convectors
Preferable location if only one convector is required to prevent overheating patients
Run outs above ceiling on floor below, to provide swing connections to convectors on both sides of columns with risers

Fig. 2. Convectors and connections to convectors.

8. Location of major ventilating and air conditioning equipment, and distribution of duct work.
9. Selection of boilers and boiler room size to provide adequate present capacity during partial shut-down of equipment for inspection or repairs, and to provide for expansion in the near or in the more distant future.

Heating Requirements

With such basic information, the engineer should make a preliminary study of the heating and ventilating requirements.

The heating system should be designed to maintain a temperature of 72 deg F. in bedrooms, corridors and service areas. Patient's toilet-rooms should be heated to the same temperature, and bathrooms should be equipped to permit heating to 80 deg. Operating rooms, recovery rooms, nurseries and delivery rooms should be heated to 80 deg.

Laundries, kitchens and sterilizing rooms generally are overheated by the equipment in them, but provision should be made for heating them to not less than 60 deg when equipment is shut down.

Rooms for storage of anesthetic gas should not be heated. Other areas should be heated to 70 deg.

Outside design temperatures used for the heating computations should be selected with the realization that the temperature in space occupied by patients cannot be permitted to go much below normal even during unusually cold weather.

Kitchen equipment normally requires steam at about 20 psi gage pressure.

Sterilizing equipment generally uses steam at 40 psi gage pressure.

Steam operated water stills operate on 40 to 60 psi gage pressure. It is advisable to check the type of stills which are to be used in the hospital and to consult the manufacturer for steam pressure and steam consumption. Re-humidifying coils for air conditioning systems serving the operating rooms may require steam at 60 psi gage pressure.

Laundry equipment should be supplied with steam at 100 psi gage pressure.

The steam consumption of various hospital equipment is given in Chapter 11 of the Third Edition of District Heating Handbook published by the National District Heating Association, Pittsburgh, Pa.

The normal and maximum steam demand should be estimated with suitable allowance for diversity of use and to include any foreseeable future demands.

Boilers

Space may be provided for the installation of additional boilers and auxiliary equipment for future additional demands. If extensions are expected in the near future, it may be preferable to provide oversize boilers in the initial installation to reduce total cost.

Three boilers are desirable, but two of adequate capacity are permissible. In either case it is essential that the boilers shall have adequate capacity to provide the steam necessary for the hospital requirements with one boiler out of service for inspection, cleaning or repairs.

With boilers that can operate continuously at 150% of their rated capacity, three boilers each normally rated at 35% of the total load, or two boilers rated at 70% of the total load should be adequate.

It is extremely important when selecting the boilers to recognize the difference between the rating methods used for different types of boilers and to determine whether the boilers selected can be operated satisfactorily at the required overload capacity when one unit is down.

Both packaged fire tube boilers and fire box type boilers are available and the engineer must decide which type is most suitable. Modern packaged fire tube boilers offer the following advantages to the user:

1. They save erection time and cost because the unit can be factory-assembled with firing equipment and controls ready to skid or lift into position, hook-up and place in operation.
2. They are fast-steaming and handle quick load changes satisfactorily.
3. They save floor space and height, thus reducing the cost of the building to house them.
4. Efficiencies of 80% in boilers up to 100 hp and 83% in larger boilers over the range from one quarter to full load may be expected.
5. They are readily adaptable for burning oil or gas.
6. The combined boiler burner unit may be tested at the factory, and approved by the Underwriters Laboratories.

Now attention is directed to fire box type boilers which offer the following advantages:

1. The purchaser may select the boilers, burner and draft equipment. This gives him the opportunity to choose equipment best suited to the requirements of the project from manufacturers who are in a position to supply him with service and spare parts without delay, when required.
2. In case of necessity, equipment may be changed more readily to burn solid fuel.

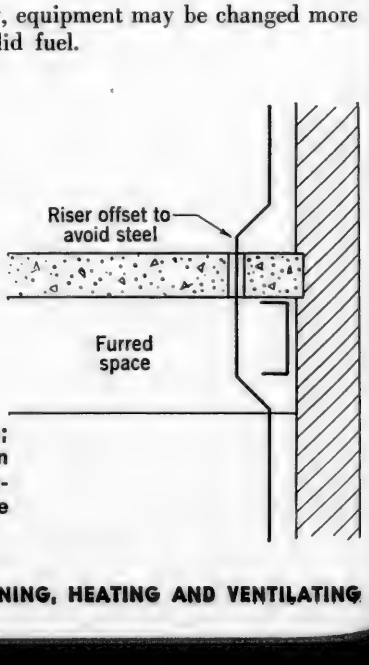


Fig. 3. Offset risers; this type construction should not be used unless the risers can be concealed.

3. Firebox boilers are rated more conservatively than packaged fire tube boilers which permits lower furnace temperatures and quieter operation.
4. Boilers are less liable to flame pulsation, and vibration eliminators are not necessary.
5. Because of lower furnace temperature, the maintenance costs for refractory are lower.
6. The boiler may be more easily cleaned, inside and out.
7. Because of the greater amount of prime heating surface to cool the gases before they enter the tubes, welding of tubes to the tube sheets is not necessary.
8. Because of the lower temperatures in the furnace, and the lower rate of transmission, the boiler should have a longer life.
9. The boiler has large water spaces, and is not sensitive to feed water conditions.

Induced draft fan equipment with a short steel stub stack above the roof may eliminate the necessity for providing an extensive brick stack for either type of boilers. A stack may be necessary, however, to discharge products of combustion above nearby buildings.

Types of Heating Systems

For the general heating of the hospital, several types of heating systems may be considered, and their relative merits should be properly evaluated, especially for a new hospital. Three types of heating systems are considered.

1. Hot water with forced circulation.
2. Low pressure steam with the supply side of the system maintained at a constant pressure, and with "off and on" thermosatic control of steam to the heating units.
3. Low pressure steam at varying pressure under automatic control in the supply system, and heating units, in accordance with outside weather conditions and required inside temperatures. Manual control only is provided on the steam supply to heating units.

Hot Water With Forced Circulation

Hot water systems with forced circulation, in the opinion of many engineers, architects and operating personnel, offer the best means for maintaining constant even temperatures through most areas of a hospital, without noise, and at minimum cost. The distribution system can be readily zoned and the temperature of the water supplied to each zone controlled to insure constant even temperatures inside the building with varying outdoor temperatures, wind and sunshine on the several sides of the buildings. There are no traps to leak or vacuum pumps to get out of order. The circulating pumps are small and of simple construction, and may readily be serviced or quickly replaced in case of failure. Piping sizes are smaller than for low pressure steam systems.

Because of the many requirements for steam at varying pressures in a hospital, steam boilers must generally be installed. If a forced circulation hot water system is to be used, hot water generators must be provided, which add to the first cost of the installation and require additional space.

Steam at Constant Pressure

Steam at constant controlled pressure, which can be varied from slightly above atmospheric in cold weather to several inches of vacuum in mild weather, may be maintained on the supply side of a heating system and admitted through "on and off" thermostatically controlled valves to the heating units. In order to permit rapid removal of the condensate through the traps on the heating units, suitable vacuum return pumping equipment must be provided. The steam supply to heating units may be under control of individual thermostats, or several units may be under control of a single thermostat.

This type of system permits maximum flexibility in temperature control to suit the individual room occupants, but is generally more costly to install and to operate. Unless carefully designed and installed, it may also be noisy because of the intermittent discharge of condensate from the heating units. The pipe sizes required are generally larger than for a hot water heating system.

Steam at Varying Pressure

A zoned system may be provided in which each zone is supplied with steam under varying pressure to suit the load and without automatic controls on the individual heating units. The system may be divided into as many zones as economically advisable, with the steam pressure in each zone as determined by a suitably located indoor-outdoor controller. To maintain the necessary pressure differential on the supply and return sides of the system, a vacuum return pump with a differential controller should be provided. A separate vacuum pump is desirable for each zone, but a single pump, if properly installed, may be used for more than one zone.

This type of system should generally be economical in the use of steam and the cost of thermostatic control equipment should be substantially reduced. As the heating units are constantly filled with steam, there should be no hammering due to the rapid acceleration of condensate when steam valves are opened. However, this type system does not permit ready variation of temperature in individual rooms to suit special requirements.

Pipe sizes, as in the second type of system, are generally large because of the low pressure available for overcoming pipe friction.

A square or rectangular building may be readily divided into two to four zones. A hospital with several wings, not at right angles to each other, will require careful study to provide a reasonable number of zones.

Zoning the Heating System

Generally, the purpose of zoning a heating system is to provide heat only where and when needed, and only in sufficient amount to offset the heat losses in sections of a building subject to differing conditions. The number of zones may be determined because of physical size of the building, exposure, stack effect for tall buildings, and occupancy.

A single zone for a large building may require excessive pipe sizes, higher initial steam pressure, and a higher vacuum on the return side to insure even heating throughout the building. By providing two or more zones, the first cost of the system may be considerably reduced, and in addition more economical and better operation may be possible.

Heating requirements of the various sides of a building differ and change continually because of exposure to sun and wind. Heat gain from the sun will vary in accordance with the season of the year, and the absence

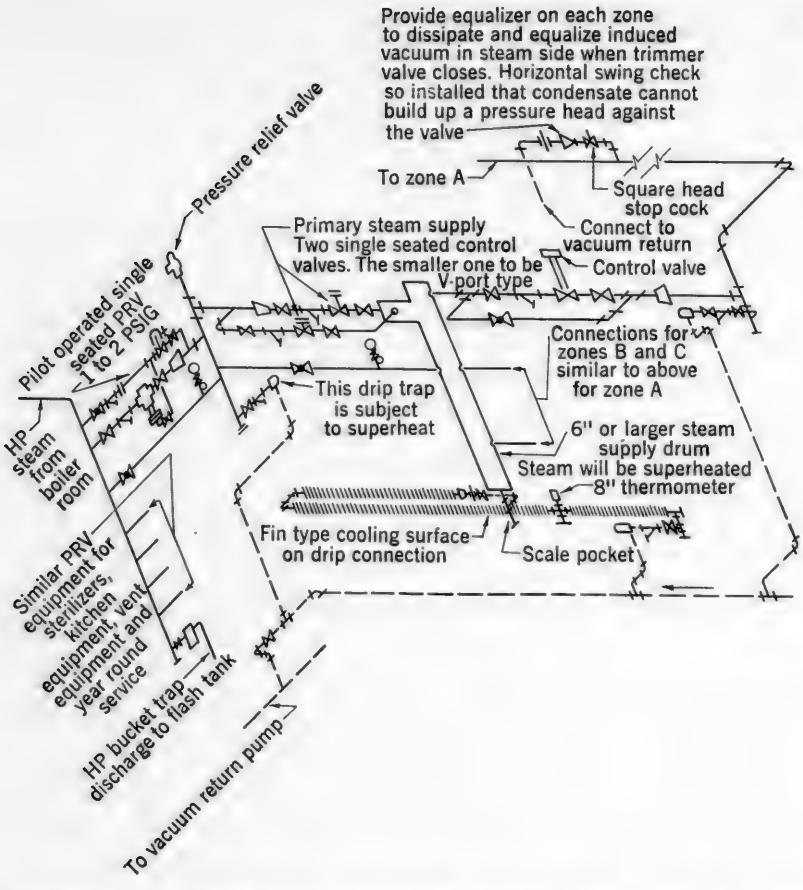

Provide equalizer on each zone to dissipate and equalize induced vacuum in steam side when trimmer valve closes. Horizontal swing check so installed that condensate cannot build up a pressure head against the valve
To zone A
Square head stop cock
Pressure relief valve
Primary steam supply
Two single seated control valves. The smaller one to be V-port type
Connect to vacuum return
Control valve
Pilot operated single seated PRV 1 to 2 PSIG
Connections for zones B and C similar to above for zone A
This drip trap is subject to superheat
6" or larger steam supply drum
Steam will be superheated
8" thermometer
HP steam from boiler room
Fin type cooling surface on drip connection
Scale pocket
Similar PRV equipment for sterilizers, kitchen equipment, vent equipment and year round service
HP bucket trap discharge to flash tank
To vacuum return pump

Fig. 4. Piping at distribution center in mechanical equipment room.

or presence of clouds; heating requirements due to wind will vary because of wind velocity. Occupancy may dictate variations in the temperature to be maintained, and the time at which these temperatures are required.

Tall buildings will be subject to different heat load requirements at various levels because of the variation in stack effect on each floor.

For the majority of buildings the number of zones into which the heating system should be divided will be a compromise between minimum first cost and the maximum economy in operation.

In the hospital shown in Fig. I, zones *A*, *B* and *C* are provided for the general heating, with separate zones for year-round heating, steam supply to ventilating equipment, kitchen equipment, sterilizing, and laundry equipment.

Radiation

Cast iron radiation has largely been superseded by fin type convectors. Where cast iron radiation is specified for new construction or for replacement of existing radiation in an existing hospital, special radiators with 3-inch spacing of the sections are not necessary. With modern cleaning facilities standard spaced sections can be cleaned satisfactorily. Built-in radiators or convectors are difficult to keep clean. Exposed wall hung cast iron or convector type radiation is preferable. Convectors should have sloping tops to insure that they are kept free from dust or books and papers piled on the top, thus preventing proper air circulation. Convectors or radiators should be wall-hung.

Where there are two windows in a bed-room, as shown in Fig. 2, a radiator should not be installed under the window nearest the bed, as this may cause overheating of the patient, and is more expensive than a single large radiator under one window.

Concealed radiators or convectors are desirable for operating and delivery rooms, but hinged panels should be provided for ease in cleaning.

Risers and Runouts

Risers and runouts should be concealed. Because of the alternate spacing of supply and return risers, as shown in Fig. 2, and to permit swing of the runouts due to expansion and contraction of the risers, it is generally necessary to locate the runouts above the furred ceiling on the floor below, and to rise through the floor to the radiators or convectors. If the steel framing does not interfere, it may be possible to conceal the vertical connections behind the furred wall, but this adds appreciably to the cost of the work. The proposed arrangement of the steel framing should be carefully studied very early in the building design to prevent the necessity of installing risers and runouts in a manner which will be unsatisfactory and a source of constant criticism of the engineer's ability. The construction shown in Fig 3 for areas where risers do not have to be concealed, will subject the engineer to such criticism because of the piping at the floor.

Supply and Return Mains

Because of the present tendency to eliminate basement space, or to use it for purposes not favorable for the

installation of exposed steam and return piping, it is necessary to give careful consideration to the distribution system.

Where suitable space is available for installation with proper pitch, the supply and return mains should preferably be located in the basement where they can be readily serviced. If, however, there is only a crawl space (which at times may be wet) below the first floor, a down feed system will be advantageous, with the steam main located where it will be accessible without disturbing patients. It will also require smaller supply risers. The return main will, however, have to be below the radiation on the first floor. The proper maintenance of traps from the drip connections at the bottom of the risers will be difficult under such conditions and, if possible, these traps should be located above the floor where they can be serviced. With this arrangement it may be necessary to provide full wall-length convector housings to conceal these traps and runouts to the heating units on the first floor.

Sub-atmospheric systems require relatively large piping which should be sized and pitched in accordance with the tables of steam pipe capacities for low pressure systems.

Distribution Center

Steam may be brought in from the boiler room at approximately boiler pressure to a reducing station in a mechanical equipment room, as shown in Fig. 4. Suitable pressure reducing valves with auxiliary equipment and bypass connections may be provided at the reducing station to furnish steam at the required pressures for the various services. To control the widely fluctuating steam requirements for the general heating system, it will generally be advisable to provide two diaphragm operated valves, one of which is sized for approximately two-thirds of the maximum load, and the other for one-third. Both of these valves should be of the single seated type with stainless steel working parts. The smaller of the two valves should be of the V-port type to provide close control of the steam flow without hunting at light loads. A 6-inch dia. or larger drum should be provided on the discharge side of these valves. From this drum there should be separate connections for each zone. Each connection should be provided with a control valve for regulation of the steam flow in accordance with the demand for the zone it serves.

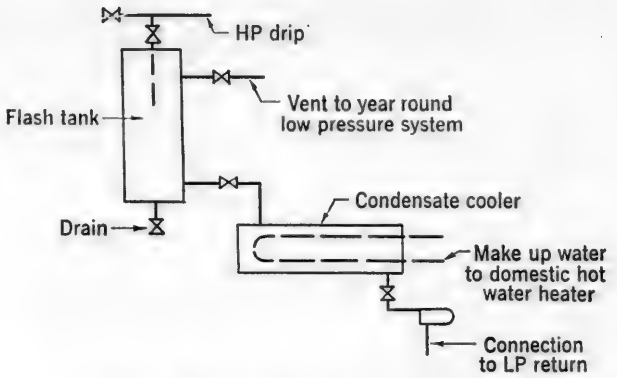


Fig. 5. Flash tank and condensate cooler.

Steam in the drum will be superheated, and adequate cooling surface should be provided on the drip connection to reduce the temperature of the condensate before it enters the vacuum return system.

High pressure drips should be discharged through an inverted bucket trap to a flash tank, as shown in Fig. 5, which is vented to the year-round heating system, and the condensate from the flash tank should be cooled by passing it through a heat exchanger. Cold make-up water for the domestic water heater may be used advantageously in the coils of the heat exchanger.

WHAT READERS SAY

Application of Impulse Traps

EDITOR, AIR CONDITIONING, HEATING AND VENTILATING

We wish to comment on the steam trap article in your March, 1958 issue which included information on impulse traps as manufactured by us.

The article stated that impulse traps should not normally be used where back pressure in the return line exceeds 25% of pressure at the trap inlet. This figure applies to traps manufactured a number of years ago. As presently made, our standard traps can be satisfactorily used for back pressures up to 40% of pressure at trap inlet. Operation against higher back pressures is possible but these cases require individual analysis.

May we also comment on the information regarding the amount of condensate required to seal the control orifice against discharge of live steam. This amount is only a few percent of trap discharge capacity when operating at any steam pressure over the full pressure range of our traps. The amount of condensate to seal the control orifice when expressed as a percent of discharge capacity is a fairly constant value over the full pressure range of the trap, because both the discharge capacity and the amount to seal vary in about the same manner with operating pressure. The figure of 50 lb per hour used in the article would apply to the specific case of our ½ inch No. 60 trap operating at 150 psig inlet steam pressure. At any other operating pressure the capacity of this trap would be different and, in turn, the amount of condensate in pounds per hour to seal the control orifice would change.

In actual practice there will be no measurable steam loss from an impulse trap the size of which has been selected to properly drain whatever steam using equipment is involved. For very light condensate loads we recently added to our line a ½ inch No. 20-A trap specifically designed to handle such applications.

In general we feel that the article was well prepared and will make an excellent reference source on the characteristics of various types of steam traps available today.

W. J. Miller

Yarnall-Waring Company
Philadelphia, Pa.

Applying Mixed-flow Units in Commercial Air-moving Systems

ANWAR A. ATALLA
Engineer in Charge of Product Development, Air Impeller Division,
The Torrington Manufacturing Company, Torrington, Conn.

The principle of mixed-flow as applied to air-moving systems is explained and data presented to help the designer in the proper selection of units. There is a discussion of a direct driven blower as against one that is belt driven. Article includes a speed selection chart.

SELECTION of air impeller units for furnaces and packaged and central air conditioners has always been based primarily on achieving the highest possible operating efficiency — a specified air flow rate in a known system for minimum power input.

In his continuing efforts to upgrade performance specifications of furnaces and air conditioners, and to improve equipment construction, the designer's work has been complicated in the last few years by an increasing need for reducing the cost and size of both the air impeller and the overall unit. The pressure on cost and size reduction has shifted emphasis in the air-moving unit from belt drive to direct drive — this change has presented an assortment of design problems.

The belt-driven blower wheel with forward-curved blades has long been the type of air impeller unit which offered the equipment manufacturer a combination of high operating efficiency and wide design flexibility. Equipped with direct drive air-moving units, many new and redesigned furnaces and air conditioners are today providing the required air flow rate at lower initial cost —but also at substantially lower operating efficiencies.

Mixed-Flow Principle

Air impelled from the periphery of a blower wheel flows radially with respect to the axis of the wheel. On the other hand, the air output of a propeller fan is axial, parallel to the fan's axis. The air, or liquid, discharged from a mixed-flow impeller has both radial and axial components. The flow leaves the impeller outward at an angle and therefore retains flow characteristics provided in both blower wheels and propeller fans.

The term "mixed flow" has on occasion been applied to a deep-bladed blower wheel with fan-like inducers on the intake ends of the blades. This type of impeller, which is not designed for use in commercial air-moving equipment, retains the fully radial flow pattern characteristic of the blower wheel.

Recent development of practical mixed-flow impeller units, while significant in designing many other types of air-moving systems, shows evidence of being particularly useful to the manufacturer of furnaces and air conditioners in obtaining substantially higher operating efficiencies in direct-driven impeller units.

The mixed-flow principle has been widely applied in impellers for liquid pumping systems but until recently has never been developed practically for moving air.

Both impeller and housing must be designed specifically to achieve mixed flow. The basic principle of mixed flow, as well as many tests in our laboratory, indicates that the design of both impeller and housing can be relatively simple, structurally strong and operable at high motor speeds.

Specific Speed

While the equipment designer is certainly concerned with the nature of the air flow and construction of the impeller unit, he is mainly interested in what the air impeller unit will do in his equipment—how much power, what size motor, what space it occupies. In order to attain the air flow he needs most efficiently, however, the designer must first select the optimum type of impeller unit, as represented by specific speed.

Any air-moving system comprising an impeller running at a given speed to produce a given air flow through a system of known resistance has a single characteristic specific speed. Similarly, the static efficiency (ratio of air horsepower output to motor horsepower input) of any type of air impeller (blower wheel, mixed-flow unit, propeller fan) varies with specific speed through a range

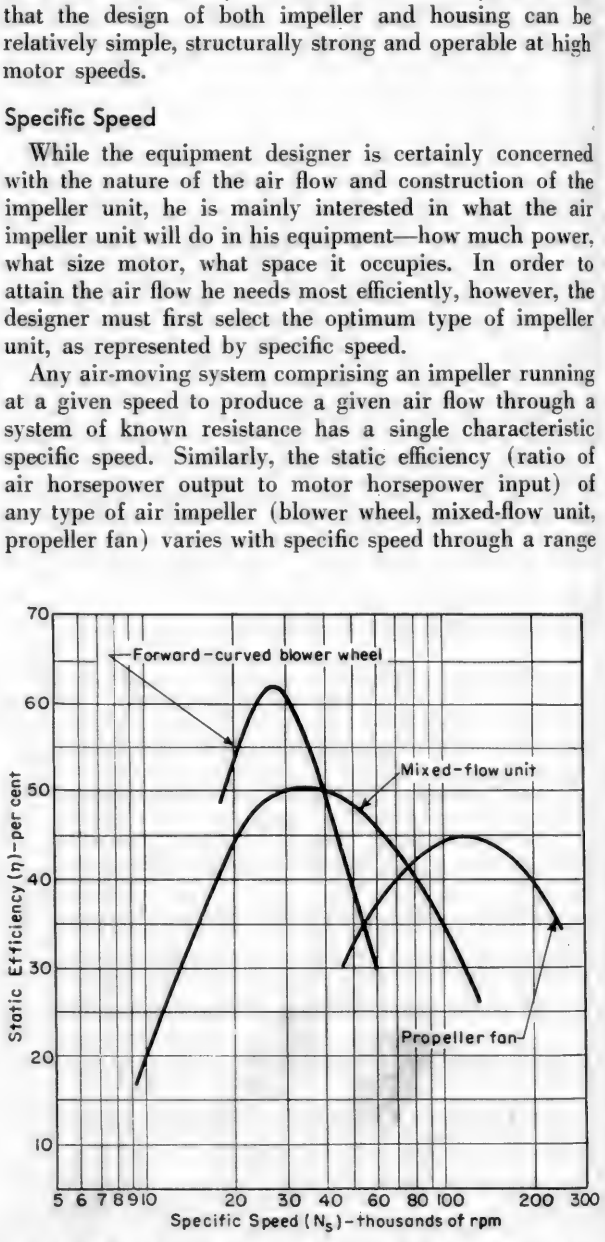


Fig. 1. Plot of specific speed against static efficiency for three types of fans.

and at magnitudes that are characteristic of that impeller type.

Specific speed is given in the expression

$$N_s = \frac{N \sqrt{Q}}{(P_s)^{3/4}} \quad \text{rpm} \qquad (1)$$

where N = motor speed in rpm, Q = flow rate in cfm, and P_s = static pressure in inches of water. Static efficiency, η, in per cent is given by the equation

$$\eta = \frac{QP_s}{63.6\ HP_i} \quad \text{per cent} \qquad (2)$$

where HP_i = shaft input power to the impeller.

The curves in Fig 1 give static efficiency as a function of specific speed (N_s) for the three types of impellers most useful in commercial air-moving systems—forward-curved blower wheels, mixed-flow units and propeller fans. Any particular impeller of any of these three types with fixed proportions has a peak static efficiency at a specific speed that is essentially independent of size. While the overall operating efficiency of an air-moving system is effected by other factors, the magnitudes of efficiency in Fig 1 and the shapes of the curve cannot be changed.

It is evident in Fig 1 that if optimum static efficiency is the designer's goal and a single specific speed defines any air-moving system at a given speed, that these three types of impellers cannot properly be considered interchangeable for any particular application. In theory at least, specification of the optimum impeller unit is simply a matter of determining the system's specific speed, selecting the impeller type which would be operating at a high static efficiency at that specific speed, and adjusting impeller size and speed to approach peak efficiency as nearly as possible.

Advantages of Blower Wheel

During the initial development of long duct warm air heating systems and more recently built-in air conditioning systems, forward-curved blower wheels and propeller fans were the only types of impellers of reasonably low cost that could be considered for use in commercial equipment. Propeller fans have not been used for this type of service for many reasons, primarily because of relatively low static efficiency, an overloading power characteristic to shutoff and the nature of its air distribution pattern. In Fig 1, the maximum static efficiency of a propeller fan is 45%, while that of a forward-curved blower wheel is about 62%.

The overloading power characteristic of propeller fans is a function of its change in power with air flow rate, as shown in Fig 2. In a warm-air heating system, for example, all dampers are open as the system delivers a flow rate Q_1 against the system pressure P_{s1} and requiring input power of HP_1. However, if a number of dampers are closed simultaneously, the system resistance curve will become steeper so that operation, for example, is at Q_2 and P_{s2} on the static-pressure curve, and a higher power input HP_2 is required. Unless the impeller motor is rated at a value corresponding to the highest expected resistance to flow, it is possible that the motor will burn out and require replacement.

On the other hand, forward-curved blower wheels have a non-overloading power characteristic in the shutoff direction. As shown in Fig 2, the slope of the power-flow curve is such that the power load on the motor will actually decrease as the home owner shuts dampers to reduce the heat supply. It can be seen that in shifting from P_{s1} to P_{s2} by opening dampers the motor can be overloaded. However, system changes are more likely to reduce air flow so that power input to a blower wheel will actually drop.

Since most efficient heat transfer is obtained with uniform air velocity and distribution in the heat exchanger, a rectangular exchanger requires the rectangular air output of a blower wheel. A propeller fan is less efficient because its output is both circular and non-uniform.

Advantages of Belt Drive

The advantage of belt drive is that the impeller speed can be conveniently set at any desired value. By selecting appropriate pulley sizes, the motor speed can be adjusted so that the blower wheel will be operating at maximum static efficiency in a given flow system. In Fig 1, the speed of a blower wheel (not the same as motor speed, of course) can be adjusted so that for the given Q and P_s, specific speed is equal to 27,500, corresponding to the maximum static efficiency of 62%.

The only possible improvement over the belt-drive forward-curved blower wheel would be the use of backward-curved wheels at the belt-drive speeds. Although a backward-curved wheel would be larger (about 1.4 times

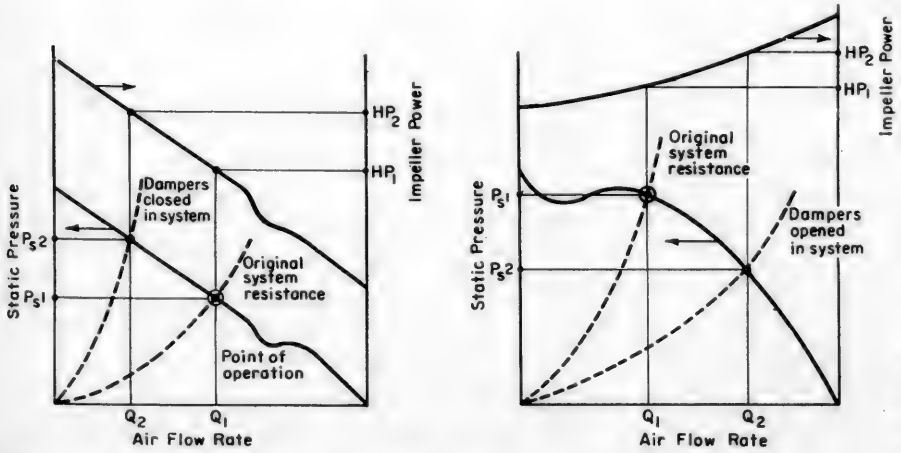


Fig. 2. Curves of static pressure against air flow rate for (left) propeller fan and (right) forward curved blower wheel.

the size of a forward-curved wheel for the same performance) and would cost more, higher static efficiencies would be obtained and the impeller unit could be entirely non-overloading. However, the trend toward reduced size and cost makes the backward-curved blower wheel impractical for commercial equipment.

Belt Drive to Direct Drive

In changing from belt-drive to direct-drive impeller operation, forward-curved blower wheels were considered preferable to impeller fans for the same reasons given. The primary problem with direct-drive blower wheels, which affects both power efficiency and unit size, is that the motor speed can no longer be controlled. The designer of the impeller unit has very little choice; he must usually specify either a low-cost shaded-pole motor at 1050 rpm or a capacitor type at 1140 rpm. In addition, when the motor is recessed in the wheel to conserve space, as is most frequently done, there is very little choice in selecting the diameter of the wheel itself. Wheels that are large enough to fit over the size motor required are usually larger than necessary for the system. In order to conserve power, as well as to reduce the overall size of the equipment, the blower wheel is usually specified with the smallest diameter permitted by the motor. As a result, the motor occupies a large part of the wheel intake area and partially obstructs the air flow, unless specially wound motors are used.

The combination of the wheel diameter limitation imposed by the recessed motor and the higher direct impeller speeds means that the same direct-driven blower wheel that operates efficiently with belt drive will operate in the same unit system at a higher flow rate (as indicated by the fan laws). In an actual case, for example, a 10⅝-inch dia belt-driven blower wheel operating at 700 rpm produces 1250 cfm against a system pressure of 0.5 inch. At a direct speed of 1050 rpm, the flow rate in the same system becomes 1875 cfm.

Since the excessive flow is undesirable, the designer is faced with two alternatives. He may introduce a supplementary resistance, such as a baffle plate or restriction, in order to reduce the flow to the desired value with the same size impeller. He may instead specify the smallest size impeller that will clear the motor in order to reduce air flow and power. In this example, the smallest standard wheel he can select would be 9½-inch in diameter, which would deliver 1500 cfm in the same system—still more than required. Therefore, supplementary resistance must again be added. The first alternative is less efficient but most frequently taken by the designer in order to maintain the same discharge area. In either event, the power input remains higher and static efficiency lower than in the original belt-driven unit.

It should be emphasized that this condition is not caused by any inherent inadequacy of direct drive forward-curved blower wheels but occurs because the higher direct speeds force operation of the impeller at specific speeds above its optimum range.

Mixed-flow Units

Mixed-flow permits efficient, low-cost operation of direct drive impellers simply because the range of high static efficiencies occurs at higher specific speeds, as indicated in Fig 1. The efficiency characteristic of mixed-flow units in this figure, although at lower levels than forward-curved blower wheels, is highest in a range where direct drive commercial air-moving systems are usually located. Peak static efficiency of a mixed-flow unit occurs at a specific speed of about 35,000 rpm, as compared to an optimum specific speed of about 27,500 rpm for the forward-curved blower wheel.

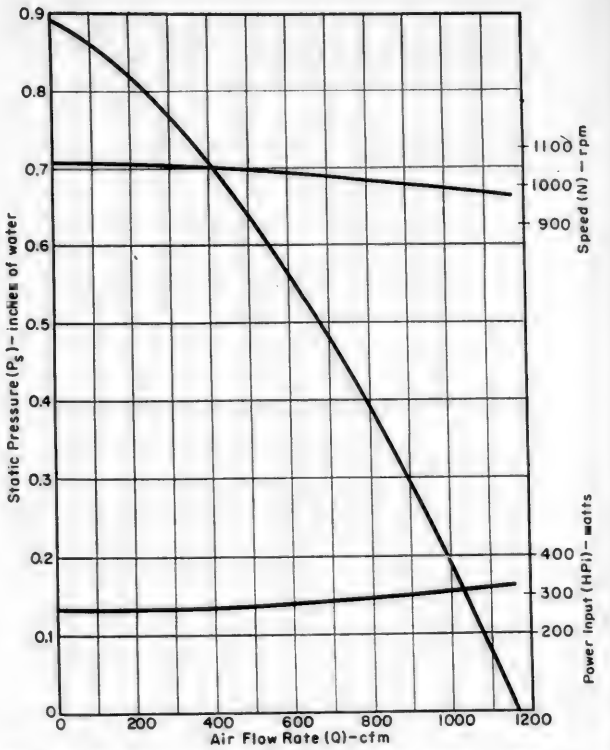


Fig. 3. Performance curves for a 12-inch mixed flow unit using a ⅛ hp, 115 v shaded pole motor operating at 1050 rpm.

The mixed-flow impeller unit is capable of efficient operation at standard speeds of 1050, 1140, 1550 and even 1725 rpm. Because the minimum wheel diameter is not determined by the motor size, the impeller diameter can be selected in combination with motor speed to approach the optimum specific speed. With freedom to operate at substantially higher motor speeds, it is possible to use a more compact impeller unit for the same flow, thereby reducing the overall size of the equipment.

The curves in Fig 3 give static pressure, speed and power input for this company's mixed-flow unit with a 12-inch impeller and a ⅛ hp shaded-pole motor at 1050 rpm. A mixed flow unit is virtually non-overloading in both directions. Because of its extremely flat power curve, a smaller motor provides sufficient power over the full range of flow from a completely closed system to free flow. In addition, the inherently steep pressure curve of mixed-flow impellers, like that in Fig 3, results in a relatively small decrease in flow rate with increased static pressure. Such a pressure characteristic is particularly useful in heating or air conditioning systems where ductwork may be extended or in air conditioners where clogged filters or wet coils can add to system resistance during seasonal fluctuations.

Specific Speed Selection Chart

The chart in Fig 4 and the curves in Fig 1 can be

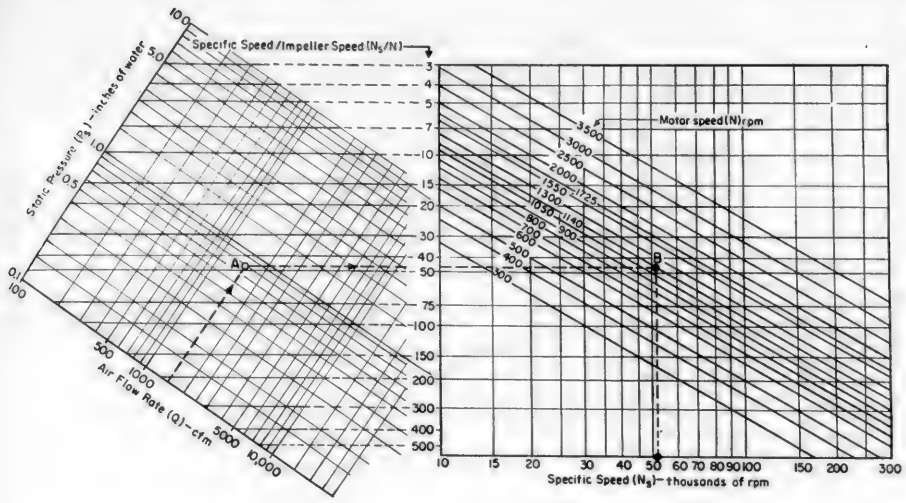

Specific Speed/Impeller Speed (N_s/N)
Static Pressure (P_s) – inches of water
Air Flow Rate (Q) – cfm
Motor speed (N) rpm
Specific Speed (N_s) – thousands of rpm
A
B

Fig. 4. Graphs and steps to follow in determining specific speed.

used to determine specific speed and the type of air impeller that will operate most efficiently in a furnace or air conditioner which must deliver a particular flow rate against a known static pressure. Both specific speed and static efficiency can be determined for motor speeds from 300 to 3500 rpm for the given flow rate and pressure. The values of specific speed and static efficiency are approximate and should be used only in selecting impeller type and operating speed.

Assume, for example, that the proper type of impeller and approximate specific speed and static efficiency must be known for a central air conditioner designed to deliver 1500 cfm against a pressure of 0.80 inch of water and with a motor speed of 1140 rpm. A reference line from 1500 on the Q scale at lower left in Fig 4 is drawn up to point A, corresponding to 0.80 on the lefthand P_s scale. A line drawn upward to the right from this point and parallel to the slanted N_s/N lines intersects the slanted motor speed (N) line for 1140 rpm on the right at point B. A vertical line drawn down from point B meets the specific speed (N_s) scale at lower right at about 51,500 rpm. In Fig 1, a vertical line from 51,500 on the N_s scale intersects the curve for mixed-flow units at about 48%, the highest static efficiency obtainable at this point.

When the pressure-flow characteristics of specific mixed-flow units are known, charts can be developed to help in determining the proper impeller and motor sizes for specific furnace and air conditioner ratings.

Mixed-Flow Impellers

The mixed-flow unit in Fig 5 was developed by Torrington Manufacturing's Air Impeller Division and placed

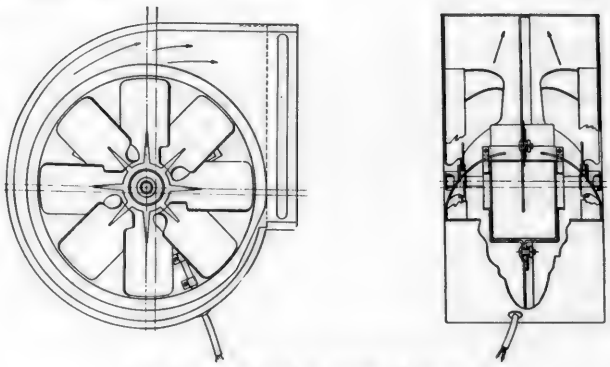


Fig. 5. Details of a mixed-flow unit.

in production last fall. Two identical fan-like impellers are rotated in separate compartments by a centrally located, symmetrically-mounted motor. There is no obstruction in either inlet, and the motor can be installed and serviced conveniently. Both motor and fan are resiliently mounted, and the equalized loading of the motor bearings provides longer bearing life.

As shown by the arrows in Fig 5 the air leaves the outer edges of the impeller blades at about a 50 deg angle, at the same time flowing radially to and through the outlet. In Fig 5, air is flowing clockwise toward the reader through the outlet opening at the top. Because there is no need for converting air pressure, the mixed-flow housing serves only to collect and direct the flow. The combined radial and axial direction of air flow is due both to the fan design and to the development of low pressure regions within the housing near the external walls.

How to Make Engineers More Productive

Engineers themselves realize that if they were relieved of much routine they would be able to devote more time to real engineering. Some engineers might increase their usefulness by being free to develop their skill and talent without unnecessary hindrance. A project is sometimes delayed because the engineer may not have enough time to give it the attention it deserves. This is discussed by G. E. Feldman in Allis-Chalmers Electrical Review.

Estimates by other writers on this subject indicate that the average engineer might spend from 10 to 30% of his time doing work at a professional engineering level. The remaining time, they infer, is spent on work which could be performed by clerks or specialized technical assistants. If engineers could devote 60 to 80% of their time to real engineering work instead of the present suggested 10 to 30%, the effect could multiply an engineering staff from 2 to 8 times by hiring clerks, typists, and technicians. While this seems to be somewhat exaggerated, certainly it is worth looking into and considering possible improvements.

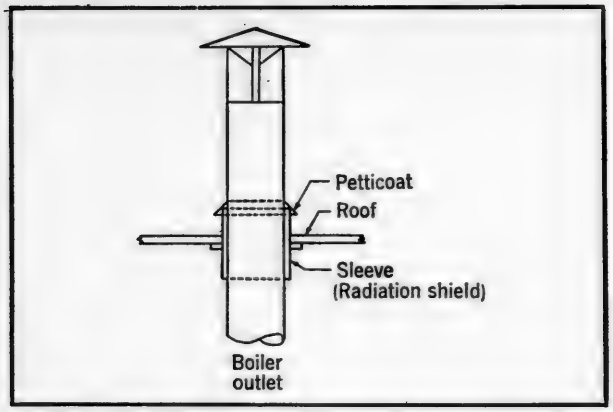


Fig. 1. The stack should extend straight up.

Design Criteria for Stacks and Breechings

An Extract from a Descriptive Specification
by the Engineering Staff of
Orr & Sembower, Inc., Reading, Pa.

Breechings and stacks play an important part in the operation of all fuel-burning equipment which is not completely realized. Increasing use of gas fuel with its peculiarities is causing additional considerations of stacks and breechings and added recognition of their importance in obtaining stable flue-gas flow conditions. However, the principles apply equally to coal and oil-fired equipment.

WHEN designing stacks and breechings, the following design criteria will prove helpful:

A straight stack from the boiler outlet through the roof should be provided. See Fig. 1.

Changes in direction, shape and flow area must be accomplished separately. All such changes must be accomplished as gradually as possible to eliminate turbulence, which would have an adverse effect on burner performance.

Breechings should be as short and straight as possible if their use is necessary. Long breechings, an excessive number of bends, or the combination of both should be avoided since they will increase resistance to flow.

Round breechings or stacks are to be preferred over square or rectangular cross sections, as the latter are less efficient and result in a higher skin friction. Square or rectangular breechings create undue turbulence and may be a large contributory factor in the generation of noise due to the resonance developed by the flat sides. Furthermore, the vortices which tend to develop in the corners of a square or rectangular breeching or stack will prevent full flow and reduce the efficiency.

Skin friction of rectangular breeching or stack becomes higher than that for square cross section when the aspect ratio increases.

Stacks and chimneys should be straight. Bends or offsets should be used sparingly. In high buildings this is frequently unavoidable due to the structural arrangement of the building. However, such chimneys may, as in the case of breechings, have a greater resistance to flow.

A stack should be higher than nearby structures or geographical prominences since they are apt to create downdrafts or eddy currents. If this is not possible, a stack hood designed to prevent downdrafts should be considered.

The stack should project at least 2 ft above the highest part of the roof when it is gabled or sloped.

Sizing

Breechings and stacks should be sized on the basis of maintaining a flue gas velocity of approximately 30 ft per sec when boiler is operating at its maximum rated output.

Common breeching for battery installation should be sized to maintain an equal pressure drop per unit length, but may be closely approximated by sizing to maintain a constant velocity of flow. Required breeching diameters sized for maintaining a constant velocity of flow are shown in Table 1.

Example: A battery installation of three boilers has the same maximum output and common breeching leading to a brick chimney, as shown in Fig. 2. It is known that each boiler requires a 14-inch dia riser in order to maintain a velocity of 30 ft per sec or less when operating at maximum rated output. The breeching between Boiler No. 1 and Boiler No. 2 should be 14-inch dia since it carries the flue gases of one boiler. By referring to Table 1 it can be seen that (1) the breeching between Boiler No. 2 and Boiler No. 3 should be 20-inch dia since it carries the additional flue gases from the second boiler and (2) the breeching between Boiler No. 3 and the chimney should be 24-inch dia since the flue gases from the third boiler are added.

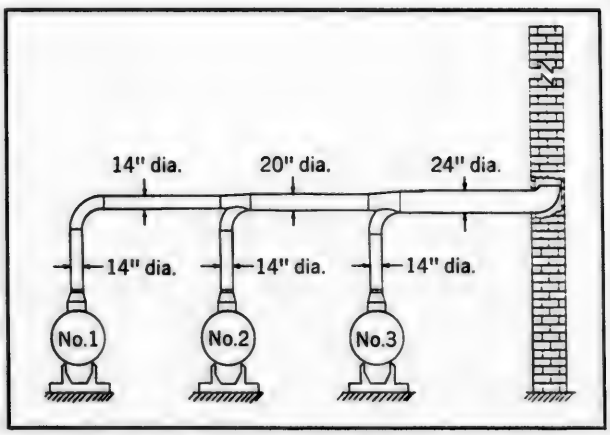


Fig. 2. Multiple installation with common breaching. Dimensions are those of illustrative example in text, above.

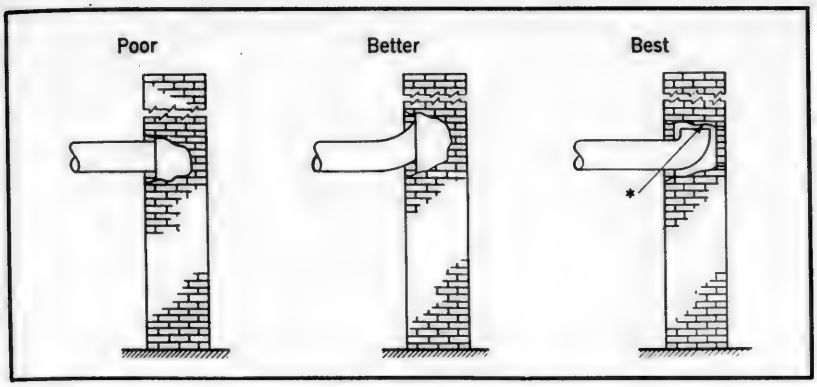


Fig. 3. Typical methods of connecting breeching to chimney. Design at left results in unstable and turbulent condition at the chimney connection. A slight deflection of the flue gases shown in center tends to eliminate the instability.

* Elbow to be adequately protected from stoppage caused by falling objects.

Connections

Do not design a one piece transition to change direction, shape and flow area. Each must be acomplished separately. Do not use mitered elbows or bullheaded tees.

Chimney

Figure 3 shows a comparison between various types of connections at the chimney entrance. Where an elbow, used to direct the flue gases up the chimney, is provided, it is of prime importance that the elbow be adequately protected so that any article falling down the chimney cannot block the flue gas outlet.

Two or more breechings should enter a stack or chimney at the same level in order to eliminate the possibility of turbulence in the breeching. They should not enter opposite sides of the chimney.

Breeching

Changes in direction of the breeching should be accomplished as gradually as possible. When using purchased stacking there is no choice of elbow radius. However, when the breeching or stack is being fabricated, circular elbows should be constructed with a minimum radius ratio R/D of 2.0 and square or rectangular elbows with a minimum radius ratio R/W of 3.0. For determining the radius ratio, R is equal to the radius of curvature of the centerline of the elbow, D is equal to the diameter of the flow area of the elbow and W is equal to the width of the elbow in the plane parallel to the radius of curvature.

Changes in cross sectional area of breeching should be accomplished by means of a transition piece having a total included cone angle of 10 deg or less. Space limitations impose a strong temptation to use excessive cone angles which will inevitably upset the flue gas flow. If sufficient length is not available to use at 10-deg total included cone angle, the change in area should be accomplished by using, first, a short cone whose maximum included angle is 10 deg, and, second, an abrupt expansion to the desired cross section.

Figure 4 illustrates two breechings entering the end of a common breeching by using transition pieces to smooth out the change in area and consequent change in velocity.

All breeching connections should be gas-tight in order to eliminate leakage of gases into the boiler room if the breeching becomes pressurized.

Stack Caps or Rain Hoods

A cap or rain hood should be installed at the top of the stack. The cap or hood should have principal dimensions as shown in Fig. 5. The clearance between the rim of the cap or hood and the end of the stack must at least equal the diameter of the stack in order to reduce the pressure loss encountered at the exit.

TABLE 1—EQUIVALENT DIAMETERS OF BREECHING FOR BATTERY INSTALLATIONS

Required diameter (inches) for one boiler	Equivalent diameter (inches) for conducting the flue gases from the indicated number of boilers.						
	2nd boiler	3rd boiler	4th boiler	5th boiler	6th boiler	7th boiler	8th boiler
8	12	14	16	18	20	22	22
9	12	16	18	20	22	24	26
10	14	16	20	22	24	26	28
12	16	20	24	26	30	32	34
14	20	24	28	30	34	36	40
16	22	28	32	36	38	42	44
18	26	30	36	40	44	48	50
20	28	34	40	44	48	52	56
22	30	38	42	48	52	56	—
24	34	42	48	54	58	—	—
26	36	44	52	58	—	—	—

Note: The sizes tabulated are based on maintaining a constant velocity of flow within the breeching.

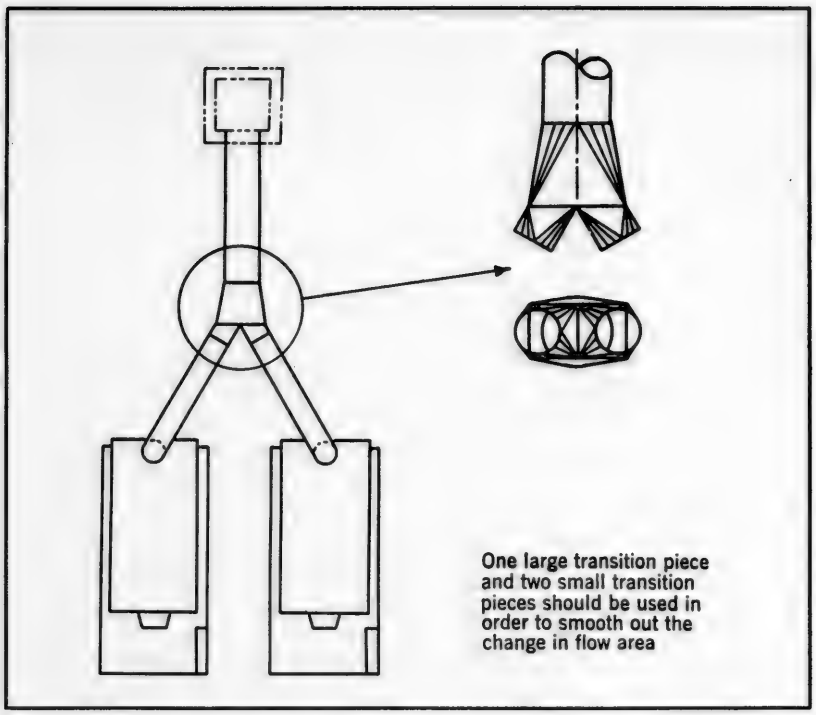


Fig. 4. Typical method of connecting two small breechings to a larger common breeching. Transition pieces are used to smooth out the change in area and consequent change in velocity. Connections should be gas-tight because of the possibility that the pressure inside will become temporarily positive.

Consideration should be given to the use of one of the various types of anti-down-draft hoods if downdrafts are unavoidable. Revolving type hoods require considerable care and maintenance to keep them from seizing and becoming inoperative.

Horizontal Breeching

Breeching should always have a slight upward slope in order to eliminate the possibility of the formation of gas pockets. Breechings should not be so long that the friction will overcome the available draft and cause an excessive pressure at the boiler. Any friction chart, showing friction loss for air in straight circular ducts, may be used. Though based on standard air of 0.075 lb per cu ft density, the readings will be sufficiently accurate to be used for determining the draft loss for flue gases in circular breeching.

Elbows

To determine the equivalent length of breeching to be added for each elbow in order to arrive at the total equivalent length of breeching, two graphs, "Loss in 90-Deg Elbows of Rectangular Cross Section", and "Loss in 90-Deg Elbows of Round Cross Section", Chapter 31, pp. 792, 793, *Heating Ventilating Air Conditioning Guide*, 1957, are recommended. When these figures are used to determine the equivalent length, the straight length of the breeching should be measured to the intersection of the center lines. As mentioned under *Breeching*, the radius ratio should be a minimum of 2.0 for circular elbows, and 3.0 for square or rectangular elbows.

Shape

Stacks and breechings should be circular in cross section. This is the most economical shape to construct, easiest to erect, and has the lowest skin friction. The entire area of a circular duct usually flows full, whereas a square or rectangular duct tends to develop a vortex in the corners and does not flow full. Flat sides are also liable to act as diaphragms and cause objectionable noise conditions.

If square or rectangular breeching must be used they should be sized first as round ducts. Then the square or rectangular sizes can be selected from Table 1, Circular Equivalents of Rectangular Ducts for Equal Friction and Capacity, Chapter 31 of the *Guide*, cited before. Aspect ratios higher than 4.0 to 1.0 are not to be used because ducts of such proportions should never be used for breechings.

When square or rectangular breechings are used they must be adequately supported and stiffened in order to reduce drumming and vibration. However, some resonance and noise may still be expected.

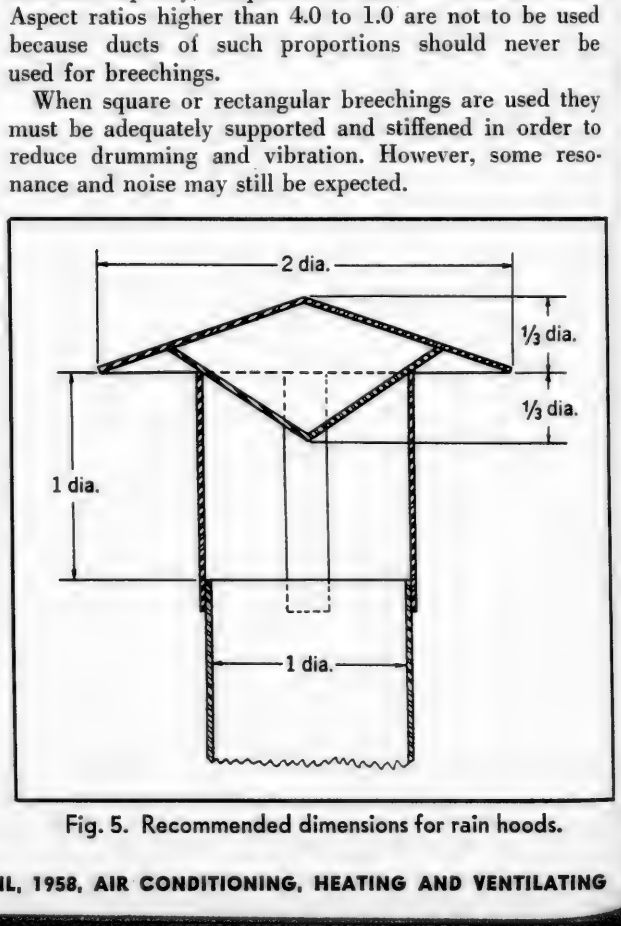


Fig. 5. Recommended dimensions for rain hoods.

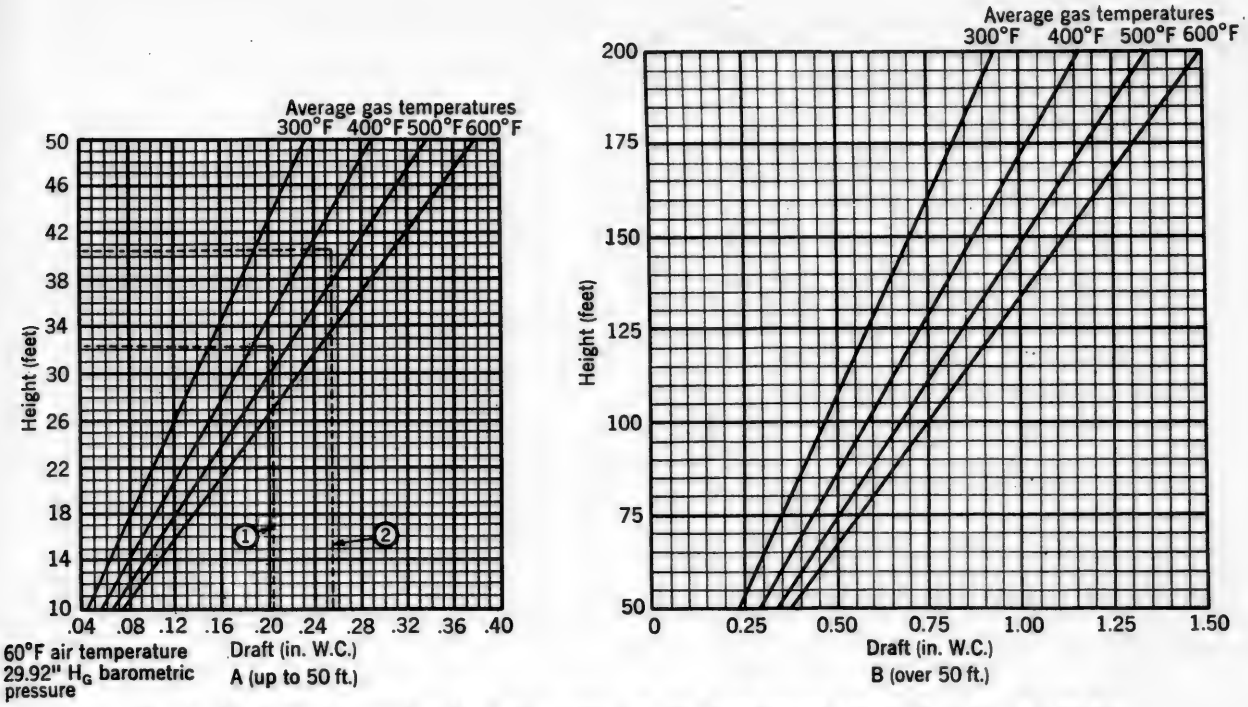


Fig. 6. Stack or chimney height vs. theoretical draft. A, left, up to 50 ft. B, right, over 50 ft.

Material

Breeching and stacks should normally be constructed of steel heavy enough to give a reasonable expected life span and also heavy enough for structural rigidity. Applicable state and local codes and regulations govern.

When selecting the stack or breeching material for a unit firing heavy oil with a high sulphur content, consideration should be given to the use of noncorrosive material when its use may be warranted by the economy realized from increased life expectancy.

Consideration may be given to use of a pre-fabricated type of non-metallic material where permitted by governing regulations.

Insulation

In installations where the expected resistance to flow is high and where outdoor temperatures may be relatively low, it may be necessary to insulate the breeching. Insulating the breeching will protect the flue gases from chilling, thereby increasing the available draft at the boiler. Such protection will also guard against the condensation of flue gases which, if permitted, may result in excessive corrosion.

Consideration may be given to the use of a pre-fabricated type of insulating material where permitted by governing regulations.

Draft

Draft or pressure differential is created by the difference between the densities of the gas column in the stack or chimney and an air column of the same height. Consequently, the factors which affect the available draft are the relative temperatures of the flue gases and the outside air and the height of the stack or chimney.

Figure 6 shows stack height *vs.* theoretical draft for various average stack temperatures in order to predict the expected draft from a stack or chimney. The actual draft available from a stack or chimney will be less than that shown in Figure 6 by the amount of the friction loss. Such losses will vary according to type of construction and materials, the diameter and height. With straight steel stacks, draft loss due to friction will in most cases be negligible.

The average temperature may be calculated by the formula which is recommended in Steam Power Plants by P. J. Potter:

$$t_g = t_a + C(t'_g - t_a)$$

where t_g = Average gas temperature, deg F,
t'_g = Gas temperature leaving boiler, deg F,
t_a = Air temperature, deg F,
C = Empirical constant, ranging from 0.85 to 0.95 for chimney heights and diameters normally used.

For practical purposes, the constant C can be taken as 0.90 and atmospheric air temperature t_a as 60 deg. Therefore when the gas temperature leaving the boiler t'_g is 500 deg, the average gas temperature t_g will be:

$$t_g = 60 + 0.90\ (500\text{-}60)$$
$$= 60 + 396$$
$$= 456 \text{ deg}$$

If the chimney has considerable height, provision must be made to reduce excessive draft. This can be done in several different ways. A hand damper, installed in the boiler or breeching, can be adjusted to reduce the draft up to a certain limit. In some cases it may be necessary to permanently open the cleanout door in the bottom of the chimney or cut a hole in the stack or chimney at a point below the breeching entrance.

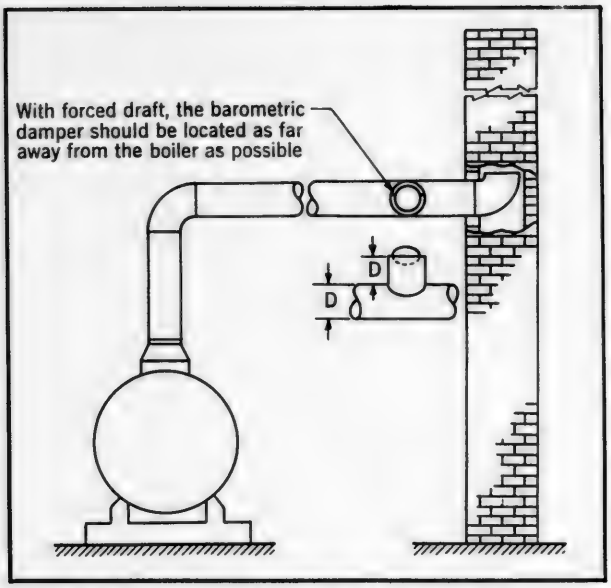


Fig. 7. Recommended location of barometric damper.

Fixed Dampers

The plate area of a fixed damper should leave an opening of 30% of the duct area at the point of installation when the damper is in the fully closed position. Provisions should be made so that the damper can be permanently locked in place after it has been adjusted to the optimum setting.

Barometric Dampers

A barometric damper may be necessary due to outside air conditions causing an unsteady flow in the stack and breeching. Before a barometric damper is installed it should be determined that the instability cannot be corrected with the controls already available *i.e.*, boiler or breeching controls.

Barometric dampers should be the same size as the diameter of the main breeching when the stack or chimney is not over 60 ft high. When the stack or chimney is over 60 ft high, the damper should be the next larger size than the diameter of the main breeching.

Care must be exercised when deciding where to locate a barometric damper. For boilers depending entirely on natural draft for supplying combustion air, the barometric damper should be located as close to the boiler as possible. For boilers depending on mechanical draft for supplying combustion air, the barometric damper should be located as far from the boiler as possible. The collar length of the barometric damper should be at least equal to the diameter of the breeching in order to keep the gate from swinging into the flowing flue gases in the breeching and also to prevent the discharge of the flue gases into the surrounding area. The recommendations for barometric damper location when depending upon mechanical draft are shown in Fig. 7.

Sample Problem

Assume we have a single boiler installation which discharges 900 cfm of flue gases at 500 deg into the breeching. The physical dimensions of the breeching leading to the chimney are shown in Fig. 8. Determine the diameter of the breeching and also the necessary

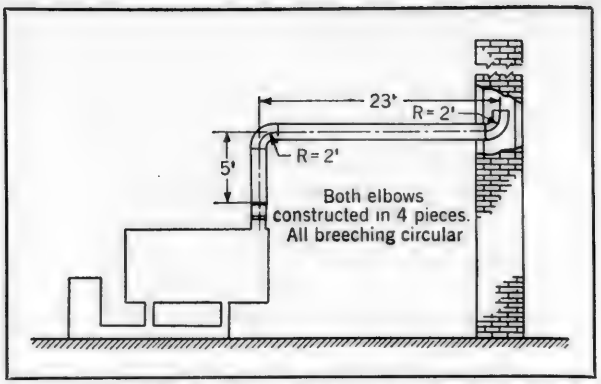


Fig. 8. Illustration for sample problem.

height of the chimney above the breeching entrance in order to offset the friction loss of the breeching. Determine the chimney height required to give a draft of .05 inches water at the boiler outlet.

By consulting an air friction chart it can be seen that for a flow of 900 cfm, a 10-inch dia breeching will give a velocity lower than 30 ft per sec. Actually the velocity will be:

$$V = \frac{\text{Volume (cfs)}}{\text{Area (sq ft)}} = \frac{900 \text{ cfm}}{.7854 \left(\frac{10}{12}\right)^2 \text{ sq ft} \times 60 \text{ sec/min.}}$$

$$= 27.5 \text{ ft per sec}$$

The radius ratio of the elbows will therefore be:

$$\frac{R}{D} = \frac{24 \text{ inches}}{10 \text{ inches}} = 2.4$$

By referring to a chart giving losses in round elbows, the additional equivalent length for a 4 piece elbow is 11.7 diameters or 11.7 times 10 which equals 117 inches or 9.75 ft. The total equivalent length is:

2 Elbows, 9.75 ft/elbow	19.5 ft
Rise	5.0 ft
Horizontal run	23.0 ft
Total	47.5 ft

By referring once again to the air-friction chart, the friction loss in inches of water per 100 ft for 900 cfm flowing through a 10-inch circular duct is 0.43 inches. Therefore, the total friction loss is:

$$0.43 \times 47.5/100 = .204 \text{ inches of water}$$

As pointed out under *Draft,* the average gas temperature will be 456 deg when the gas temperature leaving the boiler is 500 deg.

By referring to line 1 of Fig. 6A, the chimney height above the breeching entrance must be 32.4 ft in order to offset the friction loss of the breeching.

If the boiler requires a draft of .05 inches of water, the chimney draft must equal the boiler draft plus the breeching loss or .204 inches + .05 inches = .254 inches of water. Line 2 on Fig. 6A shows that the chimney height required to give a draft of .254 inches of water is 40.5 ft. It would be more desirable to make the chimney over 40.5 ft high and adjust the boiler draft with fixed damper at the boiler outlet.

IDENTIFICATION OF PIPING SYSTEMS

Schemes for the identification of piping systems have been developed in the past by a large number of industrial plants and organizations. The schemes arrived at may have given complete satisfaction to those using them but they have suffered from a lack of uniformity. Considerable confusion as well as accidents have occurred to those who change employment from one plant to another and to outside agencies, such as municipal fire departments, when called in to assist.

In order to promote greater safety and lessen the chances of error, confusion, or inaction, especially in times of emergency, a uniform code for identification of piping has been established by the American Standards Associations and published by The American Society of Mechanical Engineers. The standard is based on primary identification of the contents of a piping system by stenciled legend and secondary identification through the use of color. It is urged that industry and organizations do not use color as a means of specifying the type of material contained in a piping system unless its use is in conformity with provisions of the standard and supplementary to the use of legends.

Any material transported in a piping system will fall into one of four main classifications:

Fire Protection Materials and Equipment. This classification includes sprinkler systems and other fire fighting or fire protection equipment. The identification for this group may also be used to locate such equipment as alarm boxes, extinguishers, fire doors, hose connections, and hydrants.

Dangerous Materials. This group includes materials which are hazardous to life or property because they are easily ignited, corrosive at high temperatures and pressures, productive of poisonous gases, or are in themselves poisonous.

Safe Materials. This group includes materials involving little or no hazard to life or property in their handling. Classification embraces materials at low pressures and temperatures which are not poisonous and will not produce fire or explosion.

Protective Materials. This group includes materials which are piped through plants for the express purpose of being available to prevent or minimize the hazard of the dangerous materials previously mentioned.

(There formerly was a fifth classification, Extra Valuable Materials, identified by the color purple).

Method of Identification. Positive identification of contents of a piping system shall be by lettered legend giving the name of the material in full or abbreviated form. Arrows may be used to indicate the direction of flow. Where it is desirable or necessary to give supplementary information such as hazard or use of the piping system contents, this may be done by additional legend or by color applied to the entire piping system or as colored bands. Color identification for the four classifications are shown in Table 1. Recommended width of color bands and height of legend letters for various sizes of pipe are given in Table 2. Table 3 presents a list of typical materials transported in piping systems and their identifying colors.

Table 1. Color Identification of Classifications

Classification	Predominant Color of System	Color of Letters for Legends
F — Fire protection materials and equipment	Red	White
D — Dangerous materials	Yellow (or orange)	Black
S — Safe materials	Green (or the achromatic colors: white, black, gray, or aluminum)	Black
P — Protective materials	Bright blue	White

Table 2. Size of Color Bands and Legend Letters

Outside Diameter of Pipe or Covering, Inches	Width of Color Bands, Inches	Height of Legend Letters, Inches
¾ to 1¼	8	½
1½ to 2	8	¾
2½ to 6	12	1¼
8 to 10	24	2½
Over 10	32	3½

Table 3. Identifying Colors of Typical Materials Transported in Piping Systems

Material	Color	Material	Color	Material	Color
Acetic acid	Yellow	Distilled water	Green	Muriatic acid	Yellow
Acetone	Yellow	Drain oil	Yellow	Naphtha	Yellow
Acetylene gas	Yellow	Drain water	Green	Natural gas	Yellow
Acid	Yellow	Drinking water	Green	Nitric acid	Yellow
Air	Green	Dye	Yellow	Nitrogen	Green
Alcohol	Yellow	Ethane dye	Yellow	Nitrogen oxide	Yellow
Alum	Green	Exhaust air	Green	Oil	Yellow
Ammonia	Yellow	Exhaust gas	Yellow	Oil, lubricating	Yellow
Ammonium nitrate	Yellow	Exhaust system	Yellow	Oil, soluble	Yellow
Amyl acetate	Yellow	Filtered water	Blue	Oxygen	Yellow
Antidote gas	Blue	Fire protection water	Red	Paint	Yellow
Argon	Green	Flue gas	Yellow	Peanut oil	Yellow
Benzol	Yellow	Foamite	Red	Phenol	Yellow
Bisulphite liquor	Yellow	Formalin	Yellow	Process gas	Yellow
Blau gas	Yellow	Freon	Green	Producer gas	Yellow
Bleach liquor	Yellow	Fresh water	Green	Propane gas	Yellow
Blow-off water	Yellow	Fuel gas	Yellow	Raw water	Green
Boiler feed water	Yellow	Fuel oil	Yellow	Refrigerated water	Green
Brine	Green	Gas	Yellow	River water	Green
Burner gas	Yellow	Gasoline	Yellow	Salt water	Green
Butane	Yellow	Glycerine	Green	Sanitary sewer	Green
Butyl alcohol	Yellow	Heating returns	Yellow	Soda ash	Green
Calcium chloride	Blue	Heating steam	Yellow	Solvent	Yellow
Carbon bisulphide	Yellow	Helium	Green	Soybean oil	Yellow
Carbon dioxide	Yellow	Hot water	Yellow	Sprinkler, water	Red
Carbon monoxide	Yellow	Hydrochloric acid	Yellow	Steam	Yellow
Carbonated water	Green	Hydrogen	Yellow	Storm sewer	Green
Caustic soda	Yellow	Hydrogen peroxide	Yellow	Sugar juice	Green
Chlorine	Yellow	Hydrogen sulphide	Yellow	Sulphur chloride	Yellow
Chlorine gas	Yellow	Industrial water	Green	Sulphur dioxide	Yellow
Chloroform	Yellow	Instrument air	Green	Sulphuric acid	Yellow
Circulating water	Green	Kerosene	Yellow	Tar	Yellow
City gas	Yellow	Lacquer	Yellow	Toluene	Yellow
City water	Green	Lactic acid	Yellow	Toluol	Yellow
Coal gas	Yellow	Linseed oil	Yellow	Trichloroethylene	Yellow
Cold water	Green	Lubricating oil	Yellow	Turpentine	Yellow
Compressed air	Green	Make-up water	Green	Vapor	Yellow
Condensate	Yellow	Mercury	Yellow	Varnish	Yellow
Cooling water	Green	Methyl chloride	Yellow	Vegetable oil	Yellow
Cottonseed oil	Yellow	Mixed acid	Yellow	Waste water	Green
Cutting oil	Green	Mixed gas	Yellow	Water	Green
Diesel oil	Yellow	Monoethanolamine	Green	Water gas	Yellow

AIR CONDITIONING, HEATING and VENTILATING'S

REFERENCE SECTION

APRIL, 1958

High Velocity Dual Duct Systems for Multi-Zone Installations

N. S. SHATALOFF
Consultant, Buensod-Stacey, Inc., New York, N. Y.

Design, layout and installation practice for high velocity dual duct systems. Part 1.

New building of Liberty Life Insurance Company, Greenville, S. C., has high pressure dual duct system.

High Velocity Dual Duct Systems for Multi-zone Installations

N. S. SHATALOFF

Consultant, Buensod-Stacey, Inc., New York, N. Y.

The first of two reference sections presenting a discussion of problems associated with design, layout and installation practice for high velocity dual duct systems. These articles cover construction details for rectangular high pressure ducts, design procedure and information of value to both the designer and contractor.

MANY methods are available for conditioning modern multi-room, multi-story buildings. A variety of design objectives and dissimilarity of structural and architectural elements of the structures make it obvious that no "best for all" system can be selected and applied indiscriminately. For each application there is usually more than one type system which will fill the functional requirements specified by the owner. Relative merits of the different systems must be evaluated on the basis of owning and operating costs, as well as future adequacy and flexibility.

In recent years dual duct air conditioning has been added to the list of systems available for comfort conditioning of large buildings. This was made possible mainly by the development of equipment capable of making dual duct systems mechanically stable, and also by a better understanding, on the part of design engineers, of the advantages and limitations of dual duct systems.

The principal advantages of dual duct air conditioning systems are:

1. All conditioning equipment is centrally located, simplifying maintenance and operation.
2. The system can cool and heat simultaneously without the necessity of central zoning or seasonal changeover.
3. There is complete absence of water and steam piping, electrical equipment or wiring in conditioned spaces.
4. The system can utilize outdoor air for cooling purposes in intermediate seasons.
5. The system can be used in combination with direct radiation or other conditioning methods without interference or clash among the several

types of systems. This quality of dual duct system is especially valuable in existing buildings because no change or removal of existing heating system is required.

6. The system has extreme flexibility to meet specific design or cost objectives on any particular project.

Now that there is an understanding of this system's advantages, it is fair to point out the main limitations and disadvantages of dual duct systems in large buildings. These are:

1. To make the system mechanically stable, a large number of control points must be inserted in the air stream of the distributing system for control of volumetric delivery.
2. The space limitations and the necessity of running two ducts instead of one will require higher velocities and pressures in the duct system than have been used on conventional systems in the past.
3. The arrangement of two parallel ducts with crossovers to terminal mixing units will require special attention and study on the part of designer and installer.
4. Accessibility to terminal mixing devices will demand close cooperation between architectural, mechanical and structural designers.

The necessity of using higher pressures and velocities in dual duct conduits for conditioning large buildings introduces additional problems which are actually inherent to all high pressure systems. These problems are as follows:

1. The dynamic losses in high velocity fittings and take-offs are not yet determined with sufficient degree of accuracy.
2. The temperature gains and losses in high velocity ducts and flexible tubing also could be determined only approximately and more basic research is needed on this subject.
3. The fabrication technique of high pressure ductwork, especially of rectangular ductwork, is not yet sufficiently standardized for general application in all localities.
4. High velocities and pressures introduce acoustical problems. No standard method of presenting acoustical ratings for component parts of high velocity air handling system has yet been established. This requires the designer to rely primarily on empirical information for use in achieving desired acoustical results in conditioned spaces.

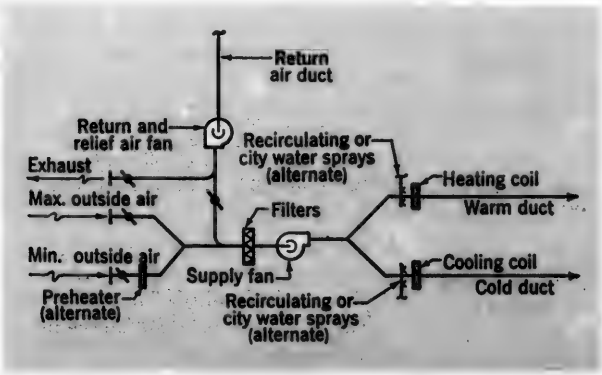


Fig. 1. Single fan dual duct cycle with blow-through dehumidifier.

About the Author

N. S. Shataloff has had many years of practical experience in the design, installation and operation of high velocity air conditioning systems while serving as chief engineer for Buensod-Stacey, Inc. He has been with this company since 1936. During this time he has also been associated with the development of equipment for high pressure application. He is a professional engineer and a member of the American Society of Heating and Air-Conditioning Engineers.

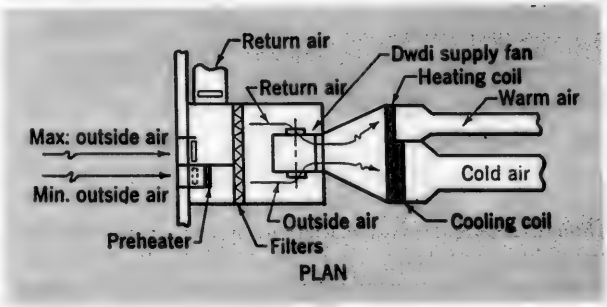


Fig. 2. Single fan dual duct cycle with stratified air.

DUAL DUCT CYCLES

The dual duct system conditions all the air in a central apparatus and distributes it to the conditioned spaces through two parallel mains or ducts. One duct carries cold air, and the other warm air, thus providing a constant air source for heating and cooling at all times. In each conditioned space or zone, a mixing valve responsive to a room thermostat mixes the warm and cold air in proper proportions to satisfy the instantaneous heat load of the space. In high pressure systems the volumetric delivery of air is controlled at terminal points in each air mixing unit. In systems with low pressures, the rise in air delivery during partial load operation may sometimes be restricted by controlling air pressures at various points in the duct system.

Basic dual duct cycles applicable to multi-zone installations are shown by diagram in Figs. 1, 2, 3, 4 and 5. Modification to the arrangements shown may be dictated by design conditions. Although these cycles actually do not represent any new concept in air conditioning process, thermodynamically all dual duct cycles are equivalent to conventional single duct systems, with face and bypass dampers at the cooling coils. Functionally the cold and warm duct dampers in dual duct mixing units are the same as the face and bypass dampers in a conventional single duct system, except that the dual duct system possesses necessary flexibility to automatically zone each area independently.

Since buildings in the majority of cases are not zoned for dual duct systems, due consideration must be given to maintenance of conditions in lightly loaded zones or no-load zones. The ability of the system to maintain conditions in no-load zones might be considered a criterion of adequacy of design for a particular installation.

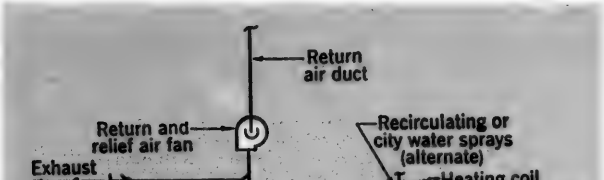


Fig. 3. Single fan dual duct cycle with additional minimum outside air dehumidifier.

Though it is conceivable that on systems with selective temperature controls, even more severe loading conditions may occur, experience has shown that when dual duct systems are designed to satisfy the conditions of no-load zones, such systems in actual operation will maintain desired room conditions at all times. The no-load zones are represented on psychrometric charts of Figs. 6 and 7 by point 2. Thermostats controlling no-load zones will demand a mixture of air from cold and warm ducts in such proportion as to make the temperature of supply air and room air the same. Practically speaking, provisions for maintenance of conditions in no-load zones will be met if cold air temperatures are kept at a sufficiently low level. The temperature range of 50 to 55 deg F in cold duct is standardized in dual duct systems.

Outdoor air dampers at the central apparatus are usually split into two sections, one for minimum, the other for maximum outdoor air volume. The maximum outdoor air damper is interlocked with the return and relief dampers and used whenever outdoor air is favorable for cooling purposes. In climates where outdoor air is not suitable for cooling, only minimum outdoor air need be provided for ventilating requirements. Return fans shown may be eliminated on small installations if provisions are made to relieve the excess outdoor air from the conditioned spaces. The main function of cold chamber sprays is to effect evaporative cooling during intermediate seasons for operating economy. The cold sprays are arranged to operate prior to the opening of the maximum outdoor dampers, thus decreasing the load on the heating coil in the warm chamber. Warm chamber sprays are only installed when control of humidity is required for winter operation.

An important point to be considered in the design of dual duct systems is the close relationship between the first cost of the system and the total amount of air handled. The first cost and annual owning and operating cost will always be reduced by using lower temperature in the cold air stream—a wide differential between cold air supply and room temperature, as explained in section on Budget Costs for Dual Duct Systems, in Part 2.

Cycle of Figs. 1 and 2

Figure 1 shows the simplest, least costly, and most compact apparatus arrangement for dual duct conditioning.

Thermostats located in each zone control the dry bulb temperature by mixing warm and cold air to give desired results. Close control of relative humidity is not essential and is never attempted for systems installed to produce comfort conditions. It has been found that humidity variations between 35 and 50% are adequate for summer operation with room dry bulb temperatures between 74 and 78 deg F.

Cold air stream temperature is normally set at 50 deg, with the air nearly saturated. The warm air stream, for summer operation, is maintained at not less than 5 deg above the average return air temperature. In winter the warm air temperature varies with that of the outdoor air.

Thermodynamically, this cycle is equivalent to a single duct system having face and bypass dampers at the cooling coil, arranged to bypass a mixture of outdoor and recirculated air in response to a zone thermostat, as internal heat load fluctuates. With falling internal heat load and prevailing high outdoor dewpoint temperatures, the cycle will produce a rise in room relative humidities unless reheat is added to the warm air.

Psychrometric representation of this cycle for specific design conditions is shown in Figs. 6 and 7.

In these two figures, the numbers on the psychrometric charts represent: 1. Average room air; 2. No-load zone conditions; 3. Average mixture of room and 25% outdoor air; 3-4. Heat of compression of supply fan; 4. Warm air; 5. Outdoor air; 6. Cold air; 7. Mixture of cold and warm air entering room at 50% load.

Figure 6 shows the state of air when internal heat gain is maximum. Figure 7 shows the conditions when internal heat gain falls to 50% of maximum. Note that both points 1 and 2 representing conditions of average room air and no-load zone are higher when the system is operating at partial load. If maximum outdoor design conditions, as shown by point 5 in Figs. 6 and 7 remain constant through the entire range of operation from 0 to 100% of internal heat load, the resulting average room conditions can be shown by curve *B* in Fig. 8. Corresponding conditions of no-load zone could be represented by the dotted line. Additional curves *A*, *C*, *D*, and *E* are plotted for arbitrarily selected warm air temperatures and will show average resulting room conditions with different temperatures of the warm air.

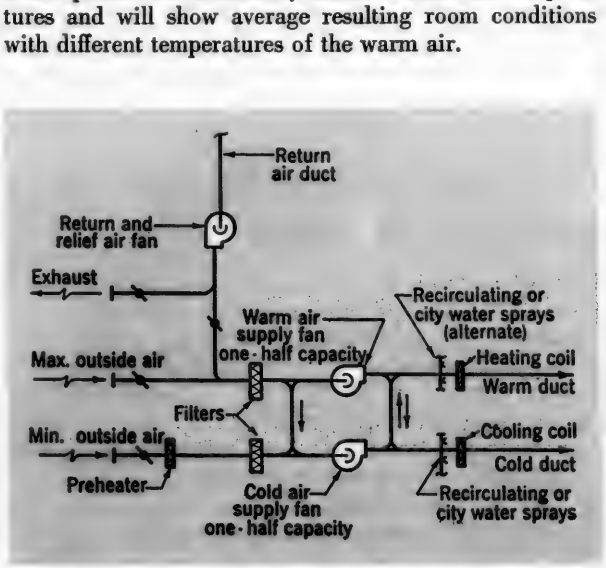


Fig. 4. Two-fan dual duct cycle with blow-through dehumidifier.

To limit the rise of humidity in conditioned spaces to 50% RH, the systems shown would require reheat in the warm air when the internal sensible heat load reduces to 28% of maximum, as shown by point X. If this system were designed with 55 deg air in the cold duct, the conditions of average room air and no-load zone over whole range of internal sensible heat loads would be as shown in Fig. 9. In such a system reheat would be required when the internal sensible load falls to approximately 64% of maximum. Furthermore, it would be impossible to prevent rise of humidities in no-load zones above 50% RH under any condition. Since in actual operation internal partial loads coincide with lower outdoor dewpoint temperatures, the build-up of relative humidities in conditioned spaces can never be as critical as theoretical calculations indicate.

The graphs of Figs. 8 and 9 are based on 25% outside air at 95 deg dry bulb, 75 deg wet bulb, 98 grains moisture per pound of dry air; room air temperature of 78 deg dry bulb.

This cycle can be used for most multi-zone office buildings which are operated during regular hours and located in moderate climates. Because there is direct bypass of outdoor air into the warm air duct, the application of this cycle is usually limited to systems which do not require more than 40% of full fan capacity for ventilation of minimum outside air.

The dual duct cycle in Fig. 1 will behave as described only if there is a perfect mixture of air on the leaving side of the supply fan. If the air stratifies, as happens when double width, double inlet fans are used, the performance of the cycle alters. When the apparatus is arranged as shown in Fig. 2, the cycle performance becomes similar in performance to the arrangements shown in Fig. 4. In Fig. 2 the fan discharges the moist outdoor air to the cooling coil and return air to the warm duct coil. This arrangement of the cycle is applicable even to structures located in humid climates because only a small part of moist outdoor air will be bypassed in the warm duct. If the position of return air and minimum outdoor air were reversed, the cycle would be objectionable for most applications. If the apparatus is arranged as shown in Fig. 2 the control instruments in the cold chamber should be of averaging type and care should be exercised not to connect separate mains to opposite sides of the cold apparatus chamber.

Cycle of Fig. 3

The arrangement in Fig. 3 overcomes the objection of bypassing excessively humid outdoor air to the warm duct on partial loads. The minimum outdoor air is normally precooled to a point which will not necessitate the application of reheat in the warm duct on high summer loads. Precooling with well water or with water leaving main cooling coils is ideally suitable for application to this cycle. Otherwise, the performance of this cycle is similar to that of the cycle illustrated in Fig. 1, but with reduced rate of humidity built up on partial loads. The air on the downstream side of the supply fan could either be stratified in a manner shown in Fig. 2, or a perfect mixture obtained to effect uniformity in the ventilating requirements to all zones.

This cycle could be applied to all systems which might be called to operate at low internal loads while high humidity conditions prevail outdoors. The systems serving hotels, hospitals or apartment buildings fall into this classification.

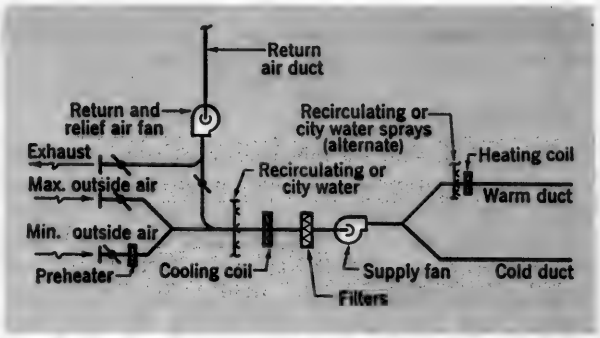


Fig. 5. Single fan dual duct cycle with push-through dehumidifier.

Cycle of Fig. 4

The two-fan system shown in Fig. 4 is the most economical to operate and will permit very close control of room humidities when less than half of total air is handled by the warm duct. During this time the system will be equivalent to a single duct system with face and bypass dampers at the cooling coils where only return air is bypassed around the cooling coil. On a further drop in the internal load, which will increase the flow of air in the warm duct over approximately half of the total system capacity, the performance of this cycle will resemble more and more that of the cycle of Fig. 1. The application of reheat to the warm duct coil still will be necessary to depress the relative humidities in the conditioned spaces during partial load operation when dewpoint temperature of outdoor air is high.

The general behavior of the system is shown on Fig. 10. It can be noted that the rate of build-up of humidity is relatively low while internal SH (sensible heat) load of the system decreases from 100 to 50%. Actually in this range no-load curve and average room condition curve, curve *A*, coincide. On further decrease in load, the humidity of both average zone and no-load zone will rise rapidly until it reaches a point where addition of reheat will be necessary. The point of application of reheat is shown at point *X* which occurs when internal SH load is 30%. It should be noted also that the curves of Fig. 10 are plotted on assumption that maximum outdoor air design conditions will prevail through entire range of operation of the system. As pointed out, in actual practice the system will operate under more favorable conditions and the demand for the reheat will not be as critical as indicated in Fig. 10. This diagram is based on 25% outside air at 95 deg dry bulb and 75 deg wet bulb with 98 grains moisture per pound of dry air; average room temperature is 80 deg dry bulb.

The entire separation of cold and warm air circuits obviously involves many operational complications on partial loads and, for this reason, is seldom used. A more practical arrangement is shown in Fig. 4 with two equalizers between the cold and warm systems, one on the downstream and one on the upstream side of the supply fans. With this cycle, all rooms taking a large portion of air from the warm duct will be ventilated only indirectly by the return air.

This cycle might be applied to systems serving hotels, hospitals, apartment buildings or office buildings which might be operated at night or at irregular hours.

Cycle of Fig. 5

Figure 5 shows an arrangement that will permit very close control of relative humidities in the conditioned spaces through the entire range of operation. However, the operating cost of the cycle, because of continuous demand for reheat, is relatively high. In addition, additional refrigeration must be provided in most installations to treat the air which will be bypassed to the warm air duct under conditions of maximum loading. For reasons of economy, the use of this cycle is not justified for the majority of comfort installations and is restricted only to special applications.

DESIGN OF DUAL DUCT SYSTEMS

The design of a dual duct system does not involve any new concepts. All basic principles, procedures and standards are fully developed and appear in the technical literature. The accepted codes and practices of all recognized groups are equally applicable to the design of a dual duct system. The objective of this article is to point out and to discuss only the specific problems and practices associated with handling air in two parallel streams.

Calculating Air Quantities

Air quantities required for a dual duct air handling system are derived from equations 1 to 7.

$$Q_c^1 = H_s^1/(t_r - t_c)\ 1.08 \quad (1)$$

$$Q_w^1 = H_s^1/(t_w - t_r)\ 1.08 \quad (2)$$

$$Q_v^1 = Q_o^1/P_o \quad (3)$$

$$Q = Q_c^1 + Q_c^2 + Q_w^{10} + Q_w^{11} + + Q_v^{(n-1)} + Q_v^n \quad (4)^*$$

$$Q = Q_c + Q_w \quad (5)$$

$$H_s + Q_w\,(t_w - t_r)\ 1.08 = Q_c\,(t_r - t_c)\ 1.08 \quad (6)^{**}$$

$$H_s + Q_c\,(t_r - t_c)\ 1.08 = Q_w\,(t_a - t_r)\ 1.08 \quad (7)^{\dagger}$$

Where:

t_r = dry bulb temperature of room air.
t_c = dry bulb temperature of cold air.
t_w = dry bulb temperature of warm air.

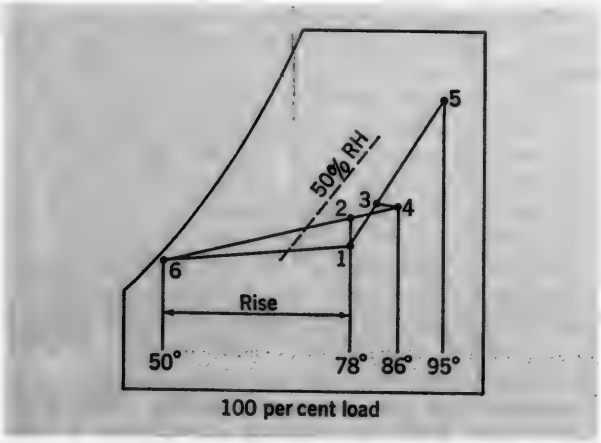


Fig. 6. Psychrometric chart for dual duct system, Fig. 1, full load.

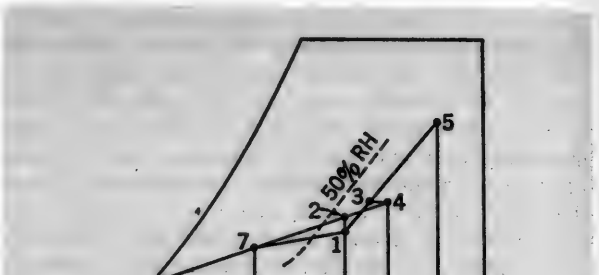


Fig. 7. Psychrometric chart for dual duct system, Fig. 1, 50% load.

H_s = total internal sensible heat load on a system during summer or winter peak, Btu per hour.

H_s^1 = internal sensible heat load of a particular zone during summer or winter peak, Btu per hour.

Q = total air handled by the supply fan, cubic feet per minute.

Q_c = total cold air required by the system during summer or winter peak, cubic feet per minute.

Q_w = total warm air required by the system during summer or winter peak, cubic feet per minute.

Q_c^1, Q_c^2, etc. = cold air required in a particular zone for summer peak, assuming that the zone receives cold air only, cubic feet per minute.

Q_w^1, Q_w^2, etc. = warm air required in a particular zone for winter peak, assuming that the zone receives warm air only, cubic feet per minute.

Q_o^1, Q_o^2, etc. = outdoor ventilating air required in a particular zone, cubic feet per minute.

Q_v^1, Q_v^2, etc. = total air required by a particular zone to satisfy ventilating conditions, cubic feet per minute.

P_o = ratio of outside to total air in the system.

Since all zones of a dual duct system are supplied by a substantially constant volume of air at all times, the air requirements for each zone must be checked for demands of summer and winter peaks and for ventilating requirements. The highest value is used to establish the zone cfm.

Equations (1), (2) and (3) are used to establish these demands.

In structures where heating is done by perimeter radiation, only equations (1) and (3) are used for this purpose.

The total air volume to be supplied by the system

* Superscripts in equation (4) refer to an arbitrary zone number.
** Summer design conditions.
† Winter design conditions.

must be equal to the sum of the peaks of all zones, as stated by equation (4). The peaks are as established by equations (1), (2) or (3).

Equations (5) and (6) determine the total cold and warm air quantities for summer peak operation. The second term of equation (6) represents heat bypassed in the warm duct under maximum load conditions. The solution of equations (5) and (7) will establish the cold and warm air demand for winter peak operation. The second term of equation (7) will represent the net cooling effect due to bypass of cold air in the cold duct during the winter peak. The second terms of both equations (6) and (7) actually do not constitute "system penalty" but represent part of the ventilating load and heat of compression of the supply fan.

EXAMPLE:

Q = 60,000 cfm (as calculated from equations 1, 2, 3 and 4)

t_r (summer) = 78 deg
t_c (summer) = 50 deg
t_w (summer) = 86 deg
} See Fig. 6

H_s (summer) = 1,400,000 Btu per hr
t_r (winter) = 75 deg
t_c (winter) = 55 deg
t_w (winter) = 125 deg
H_s (winter) = 2,100,000 Btu per hr

Determine cold and warm quantities for peak summer and winter operation:

For Summer Operation:

$$1{,}400{,}000 + Q_w\ (86\text{-}78)\ 1.08 = Q_c\ (78\text{-}50)\ 1.08 \quad (6)$$
$$60{,}000 = Q_c + Q_w \quad (5)$$

Solving equations (5) and (6):

Q_c (summer) = 49,500 cfm
Q_w (summer) = 10,500 cfm

For Winter Operation:

$$2{,}100{,}000 + Q_c\ (75\text{-}55)\ 1.08 = Q_w\ (125\text{-}75)\ 1.08 \quad (7)$$
$$60{,}000 = Q_c + Q_w \quad (5)$$

Solving equations (7) and (5):

Q_w (winter) = 45,000 cfm
Q_c (winter) = 15,000 cfm

TABLE 1—FACTORS FOR COLD AND WARM DUCT DESIGN

COLUMN A	COLUMN B	COLUMN C	COLUMN D
Ratio of System Summer Cold Air to System Total Air=Q_c/Q	Ratio of Zone Cold Air to Total Zone Air for Purpose of Sizing Cold Duct	System with Supplementary Heating System at Perimeter of the Building	100% Air System
		Ratio of Warm Duct Area to Cold Duct Area	
1.0 to 0.9	1.0	0.70	0.80
.89 to .89	0.95	0.70	0.80
.84 to .80	0.90	0.75	0.85
.79 to .75	0.85	0.75	0.85
.74 or smaller	0.80	0.80	0.90

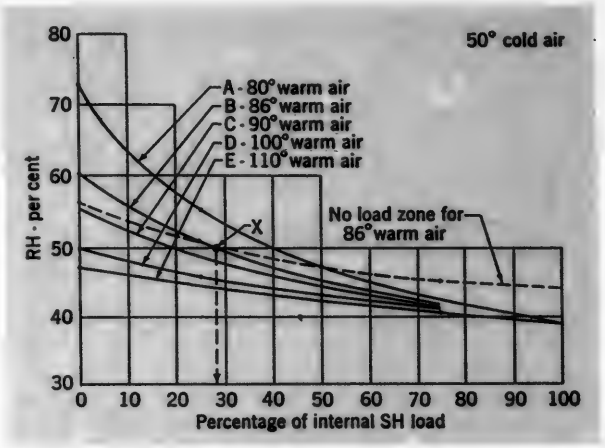


Fig. 8. Performance over range of internal sensible heat load; system of Figs. 1 and 2 for 50 deg cold air.

Air Quantities for Design of Cold and Warm Ducts

After the air quantities needed for each zone are established by equations (1), (2) and (3), the exact determination of air flow in the cold and warm ducts becomes a rather time-consuming process, especially on larger installations. In cold ducts, for example, it will be necessary to calculate flow at 2 or 3 periods of the day to establish the highest rate of flow in different branches. The calculated rate of flow would then have to be corrected for the warm air bypass if the design warm air temperatures are higher than the average room design temperatures. During the heating season, actual demand for maximum warm air in each zone would have to be calculated and then corrected to compensate for cold air bypass in the cold duct. At the same time, the flow through the warm ducts should be analyzed, considering partial load operation during the cooling cycle.

For a system which feeds both exterior and interior zones, a simplified procedure may be used as follows, to establish air quantities for sizing cold and warm ducts. For most comfort installations this procedure, if followed, will introduce a slight safety factor in the design of the duct system as compared to exact calculations. In general, the steps are:

1. Size the cooling coil for the quantity of cold air indicated by equations (5) and (6).
2. Establish the ratio of total summer cold air to the total system air. In the example given, it will be $49{,}500/60{,}000 = 0.83$.
3. Using Table 1, select a corresponding factor from column *B* and use this as a multiplier for all zone air quantities as established by equations (1), (2) or (3). The factor for the example would be 0.90. The air quantities established in this manner can be considered to be simultaneous peak requirements for design of cold air ducts.
4. After the cold duct sizes are determined, select the corresponding area ratio of warm duct to cold duct from columns *C* or *D* of Table 1 and use this ratio as a multiplier in determining warm duct sizes. The ratio in the example will either be 0.75 or 0.85 depending upon the type of the system.

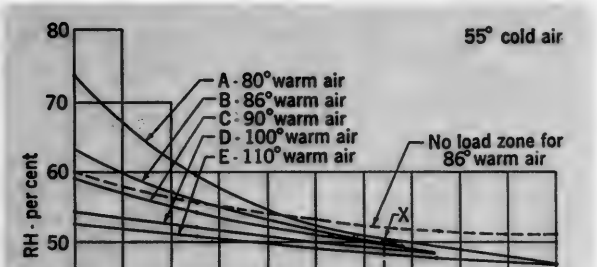


Fig. 9. Performance for same system as Fig. 8 but for 55 deg cold air.

5. Select the dual duct mixing units and size low pressure ducts leaving the units, using the total zone cfm as established by equations (1), (2) or (3).

As an alternate to the procedure described, the cold air quantities and cold duct sizes could be determined by any desired method and warm ducts are then sized by using factors from columns *C* or *D* of Table 1. The alternate procedure may be more desirable when the central systems are zoned or when the duct mains supply air to either interior or exterior zones.

Sizing Technique for Cold and Warm Ducts

After the general scheme of the ductwork is established, and the air to be supplied to each section of the system is calculated, the actual sizing of the ductwork does not differ greatly from that used for other systems.

In dual duct systems where volume regulation is accomplished at terminal points, the duct sizing technique becomes even less critical than for other systems, and extreme precision in duct sizing becomes superfluous. The ducts may be sized by equal friction, static regain or velocity methods, or a combination of all three, if desired. Volume regulators in mixing units will absorb all pressure unbalance caused by the initial design, partial load operation or future unavoidable changes in load distribution and will produce a mechanically stable system under all operating conditions, irrespective of the method or procedure used for duct sizing.

On dual duct multi-zone installations there will be an infinite set of operating conditions which will create rates of air flow in the cold and warm ducts entirely different from those used in the original design. For this reason, the possibility of achieving uniformity in duct pressures, for the purpose of volumetric control by some program of duct sizing, is very limited.

Every effort should be made in designing the ductwork to reduce the total power needed to produce the required rate of flow in the supply system. This will assure a quieter system, reduce duct leakages and will approach in the majority of cases the point of maximum owning cost economy.

The basic objective in designing a distribution system is to obtain minimum owning cost by balancing the increment cost of power against the increment cost of ductwork, including all associated costs such as insulation, motors, starters, wiring, etc. For most dual duct systems, the analysis of cost factors indicate economy of larger ducts if the cost of the building structure is disregarded. However, the relative economy of a larger duct vs. power is not of such magnitude as to justify extensive cost calculation in ordinary design work. Economy will be achieved if efforts are made to keep the total resistance of the system to a practical minimum by utilizing most effectively the space available.

The chief justification for high duct velocity is space limitation created by past and present architectural and structural practices. By necessity, in a majority of multi-zone installations, relatively high velocities and high friction rates must be used in some parts of the distribution system. On the other hand, where space is not at a premium, the use of high friction rates is not economically justifiable. In most installations there will always be a point or points of greatest space restriction where the duct velocity must be high. As soon as these points are passed and space becomes less critical, the friction rates should be gradually reduced toward the low end of the duct system. For example: The longest run may be started with a friction rate of 0.75 inch per 100 ft and then gradually reduced toward the end to say 0.15 inch per 100 ft, giving an average friction rate of 0.45 inch per 100 ft. Such a procedure may involve additional work in estimating the total duct friction but will in general satisfy the requirements of economy. The shorter duct branches, if desired, may be equalized in the usual manner by using the equal friction method of sizing.

For installations where no space restrictions exist, the ductwork may be sized by the equal friction method, using low friction rates of say 0.20 to 0.30 inch per 100 ft. The shorter branches again could be equalized as previously described. The straight, long risers may be sized effectively by the static regain method, in this manner achieving equal static pressures at the takeoffs for each floor under specified set of operating conditions.

A substantial saving in duct friction is usually achieved by a careful study of the duct mains adjacent

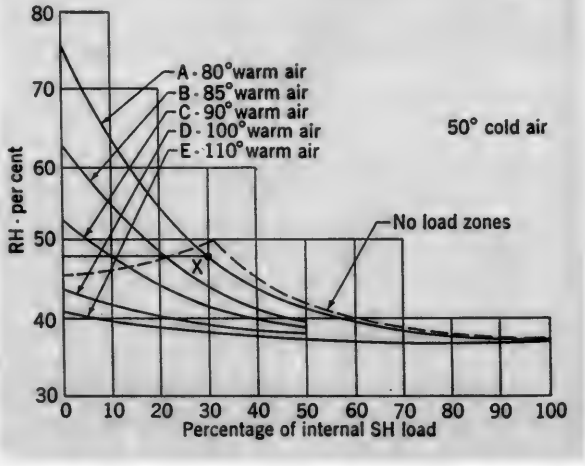


Fig. 10. Performance over whole range of internal sensible heat load for dual duct system of Fig. 4 for 50 deg cold air.

to the apparatus room. The connections to the cold and warm plenums should be made as streamlined as possible to reduce the entrance loss to the high velocity duct. In actual layout this is usually accomplished by using a funnel shaped fitting between the high velocity ductwork and the plenum. In many cases the space conditions at the apparatus room are not critical and a large duct can be used in this area. The duct velocity can then be stepped up gradually when the point of space restriction is reached.

The inefficiency of static and velocity pressure conversions must be carefully evaluated because in high velocity systems it may represent an appreciable part of the total resistance to be imposed on the supply fan. Velocity and static pressure conversions will occur at several points:

1. In blow-through dehumidifier, a major part of the velocity pressure developed by the supply fan will be lost. The loss will be 60% to 70% if the sheet metal connection between the supply fan and dehumidifiers diverges at a rate of approximately 30 deg. If the fan is located closer in relation to the dehumidifier, the regain will be negligible, if any.
2. In the main ductwork, it is safe to assume that only 50% of the velocity pressure will be regained. For example, if the highest velocity in the duct is 4000 fpm and the terminal velocity is 2000 fpm, the total loss will be $[(4000/4005)^2 - (2000/4005)^2] \times 0.5 = 0.375$ inches. This 50% figure is recommended by the *Guide*. There are indications, however, that a higher percentage of regain may be expected in well constructed ductwork.
3. The velocity pressures in the round connection to the last mixing unit can not be credited with regain. This pressure must be considered as the part of the total energy required to create the needed rate of flow through the unit. Rating tables for mixing units are normally based on the static pressures at the entrance of the unit, which means that velocity pressures should be added to this value, to establish total pressure loss through the unit.

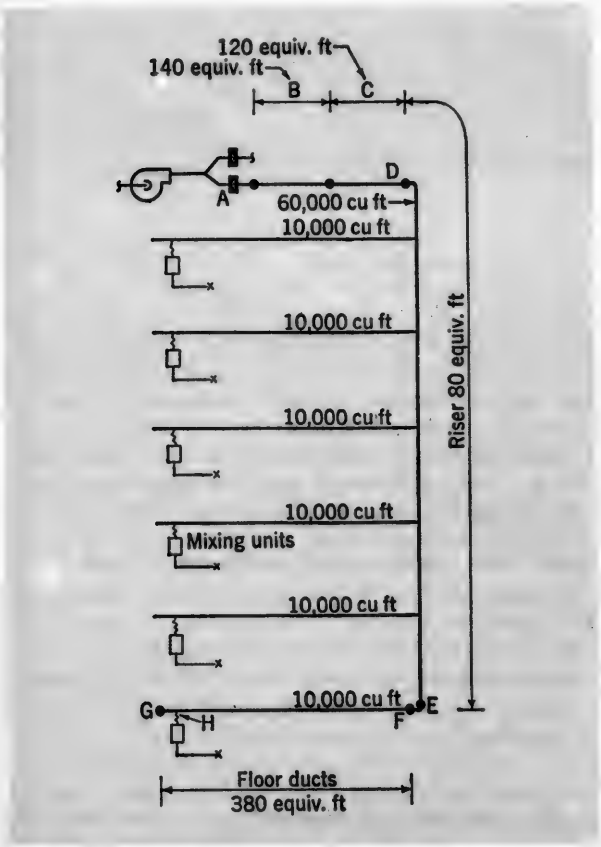


Fig. 11. Dual duct system showing cold duct only.

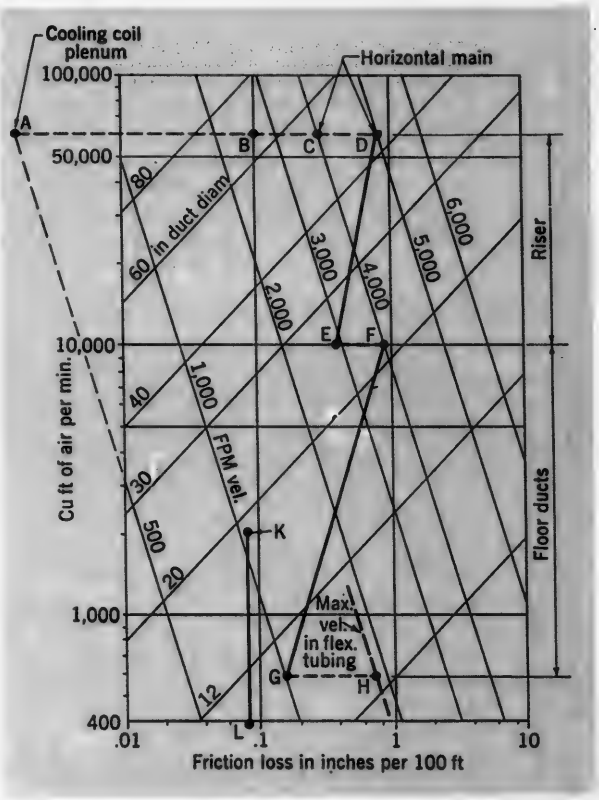


Fig. 12. Air friction chart; design conditions of dual duct system of Fig. 11.

Maximum velocities recommended for cold and warm ducts are given in Table 2.

For duct elbows having velocities less than 2500 fpm, ordinary turning vanes may be used. For higher velocities the vanes should be streamlined, having no sharp edges. It is also recommended that vanes of streamlined construction be used on all sharp offsets and transformers handling high velocity air. In square elbows the

TABLE 2—RECOMMENDED MAXIMUM VELOCITIES IN COLD AND WARM DUCTS

CFM CARRIED BY THE DUCT	MAXIMUM VELOCITIES FPM
60,000 to 40,000	6,000
40,000 to 25,000	5,000
25,000 to 15,000	4,500
15,000 to 10,000	4,000
10,000 to 6,000	3,500
6,000 to 3,000	3,000
3,000 to 1,000	2,500

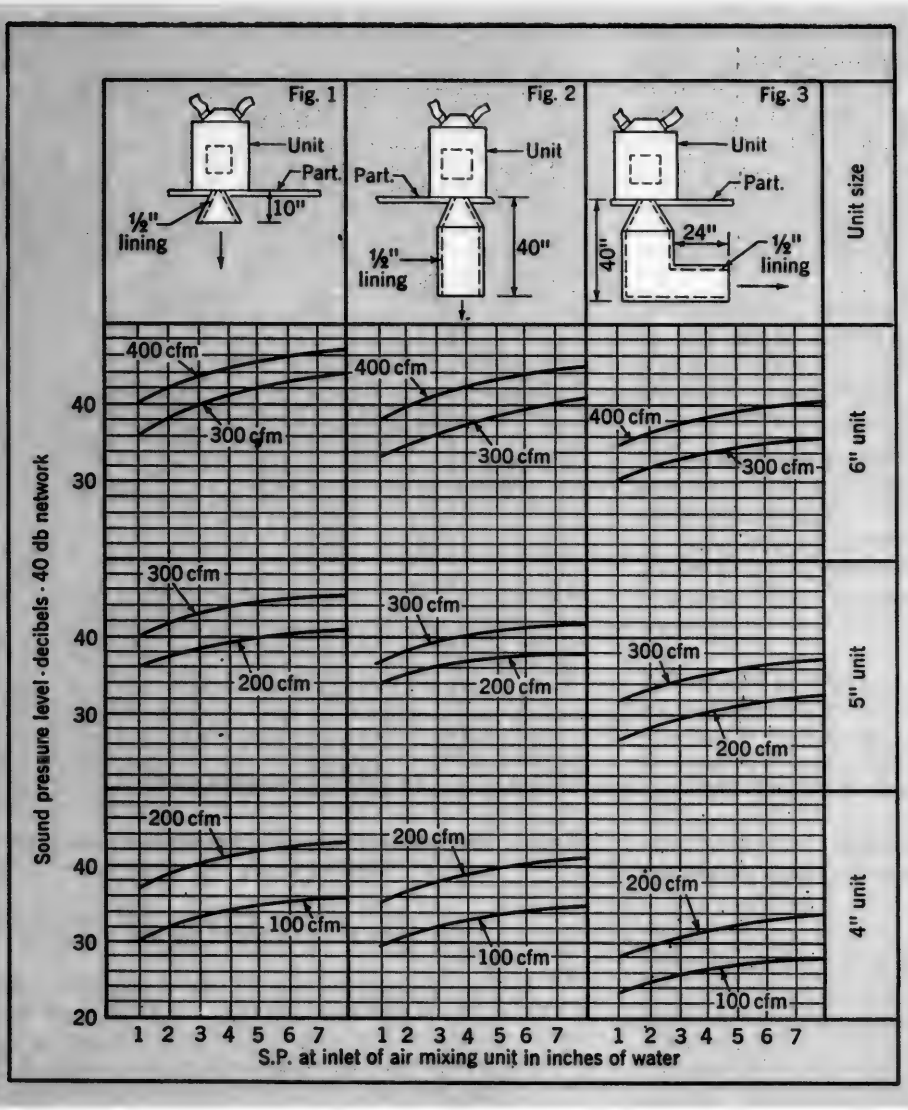


Fig. 13. Room sound pressure level obtainable with typical duct units using different arrangements of low pressure ducts.

turning vanes should be extended at least 5 inches on the downstream side of the vanes. Extreme care should be exercised in designing vanes for fittings placed in series and located close to each other. With high velocity air, two unvaned or poorly vaned fittings in series might create air turbulence and rumble which may nullify all sound attenuating provisions made in the air handling system close to the fan.

A Few Don'ts

1. Avoid the use of dampers for adjustment of distribution. They are practically useless in a dual duct system with its inherently unstable pressure characteristics. In systems with relatively high velocities, they are a source of noise, leakage and an unnecessary expense.
2. Avoid splitters of any kind. They not only are a source of noise but can actually cause distributional troubles.
3. Avoid unvaned rectangular elbows.
4. Avoid undersizing the small ducts and take-offs from mains to mixing units.
5. Avoid offsets if possible. When not possible, the transformations and bends should be kept easy and usually require turning vanes.

The maximum total pressure which may be used in designing a dual duct system will depend chiefly on the characteristics of the mixing units used. At the present time, constant volume units are commercially available which will absorb up to 8 inches of SP (static pressure). If operating duct pressures exceed the maximum pressures for which a particular unit is designed, additional static regulation will be required in the duct system.

General Procedure for Sizing High Pressure Ducts—Example

A system supplying 60,000 cfm of cold air is diagrammatically shown in Fig. 11. The space conditions are critical at the top of the riser and at the take-off to each floor, as designated by points *D* and *F*. The maximum permissible duct sizes are determined at these points and corresponding velocities are plotted on the air friction chart in Fig. 12. The increase in air velocity from point *A*, in the plenum chamber, to point *D* is accomplished in two steps. Part of the horizontal main is sized for 2600 fpm and part for 4000 fpm, as indicated by points *B* and *C*. These velocities are again determined from con-

sideration of space conditions. The vertical riser sizes are selected on line *DE*. This line closely resembles the static regain line, assuming that 50% of the velocity pressure is regained in the riser. The horizontal ducts on each floor are sized on line *FG*. The point *G* is arbitrarily picked for a relatively low friction rate. The velocity in the flexible connections to the mixing units are stepped up to point *H*, as required by the inlet size of the selected unit. The low pressure ducts leaving the mixing units are sized on equal friction line *KL*.

The total resistance of the system is calculated as follows:

Item	Inches of Water
Apparatus	1.25
Horizontal Main *B* —	
140 E. Ft @ 0.1 inch/100 ft	0.14
Horizontal Main *C* —	
120 E. Ft @ 0.23 inch/100 ft	0.28
Riser *DE* —	
80 E. Ft @ 0.56 inch/100 ft ave	0.45
VHd @ 5000 fpm — 1.56 inches	
VHd @ 2800 fpm — .49 inch	
1.07 — (50% loss)	0.54
Floor Ducts *FH* —	
380 E. Ft @ 0.40 inch/100 ft ave	1.50
VHd @ 4000 fpm — 1.00 inch	
VHd @ 1000 fpm — .25 inch	
.75 — (50% loss)	0.37
Loss through flex, and tap-off *H*	0.25
Last dual duct unit	1.00
Low pressure ductwork and outlet	0.15
Total inches of water	5.93

After the cold duct sizes are determined, it is more practical to size the warm duct by using factors from Table 1. It is obvious from the example considered that no set procedure can be followed in sizing the duct system. The judgment of the design engineer and space conditions of each project will always be the chief factors in selecting duct sizes.

After the duct sizes are determined by a method such as described, it is recommended to carefully examine the entire duct system and to make further changes in the duct sizes by:

1. Eliminating unnecessary transformations, thus keeping the number of duct sizes to a minimum.
2. Standardizing the duct sizes in order to have as many duplicate sizes as possible.
3. Increasing, by inspection, the end run sizes of longer branches or those branches where load may be expected to increase in future.
4. Eliminating unnecessary fittings, cross-overs, etc. This procedure may increase the weight of the metal slightly but it will reduce the actual cost of the installation and assure a more flexible and tighter distributing system.

Return Air Ducts

Return air ducts are sized at low velocities as in any conventional system. Attempts to pressurize the return duct have not as yet proved to be entirely successful; clogging of high pressure throttling valves by lint and dust still presents a problem. One scheme to simplify the arrangement of the dual duct system is to use hung-ceilings or corridors for return plenums and collect all return air at central points on each floor. In some localities there are code restrictions to this method.

Low Pressure Ductwork

Low pressure ducts leaving the mixing units are sized as any other conventional ductwork. Normally this ductwork is sized for a friction rate of 0.08 inch to 0.10 inch per 100 ft based on ASHAE duct friction charts, which will give an approximate friction rate of 0.10 inch to 0.12 inch per 100 ft, if ductwork is lined. Since, in the majority of cases, the dual duct systems are designed for low cold air supply temperatures, the low pressure ductwork must be either lined or insulated externally. The internal lining is preferable in all cases for acoustical reasons.

Experience has indicated that the least expensive and the safest way to assure a quiet installation is to have some length of lined ductwork on the leaving side of the mixing unit. The lined ductwork, especially when it contains one or two elbows, is a very effective sound attenuator, as shown on Fig. 13.

The lined ductwork will also provide a necessary safety factor in acoustical design if noise regeneration should occur in the air distributing system because of poorly constructed ducts, fittings and tap-offs.

In the Next Issue

The second article, scheduled for the following issue, will cover basic schemes of air distributing systems, dual duct air handling apparatus, budget costs for dual duct systems, automatic control, winter and intermediate season operation, and dual duct construction and specifications.

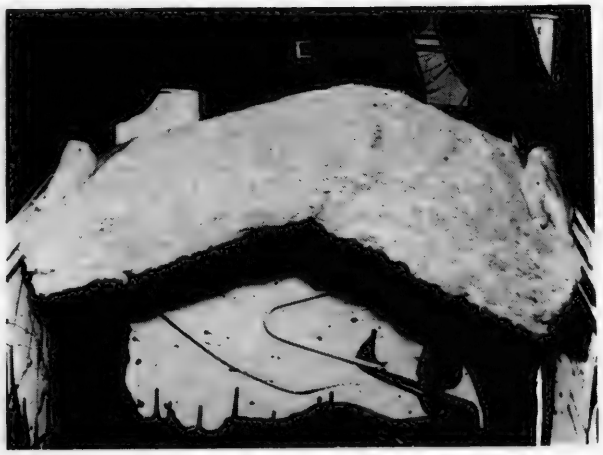
Buildings of Rockefeller Center, New York City, have high pressure dual duct systems.

"PURE AND SIMPLE." Practical solutions to the problems of industrial waste and water conservation are detailed in this new motion picture released by Public Relations Dept., Link-Belt Co., Prudential Plaza, Chicago 1, Ill. Film highlights ways in which industry, user of over 80-billion gallons of water daily, can conserve this natural resource by combatting pollution, salvaging valuable by-products, re-circulating water, and treating sewage wastes. Film has a running time of 19 min, and is reserved by letterhead request for free showing to companies and organizations concerned with industrial waste problems.

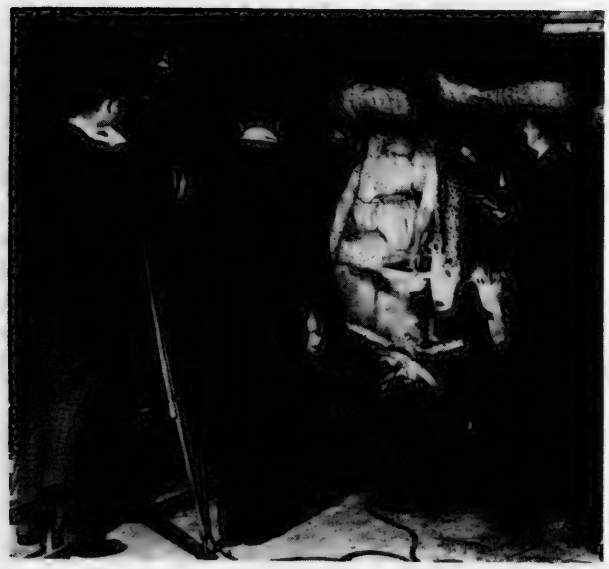
"THE MOISTURE STORY." Meet Mr. Hugh McDew, virile star of this full-color slide film produced by Ansul Chemical Co., Marinette, Wis. During the next few months thousands of refrigeration service engineers will bear with McDew as he gets drenched when moisture is rampant in a refrigeration system. The 20-min story ends on a bright note when McDew conquers the forces of evil with company's Super Dry-Eyes and T-Flo driers.

Picture Paragraphs

No Oscars, just "orchids" to . . .

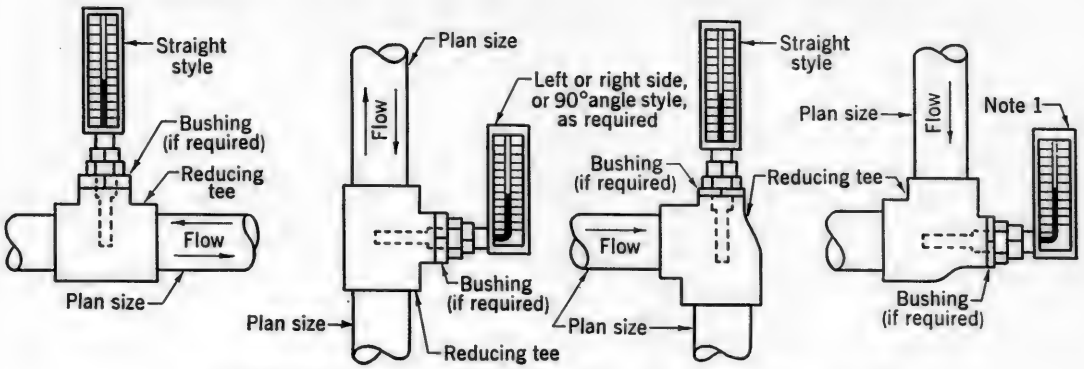


"LAYING IT ON THE LINE." This 15-min color film, designed to show production line workers how insulation should be installed and why proper installation is important, is available to refrigeration equipment manufacturers from Insulation Div., Armstrong Cork Co., Lancaster, Pa. Film is an informative and entertaining course in avoiding cabinet failure which results from improper sealing or insulating jobs.

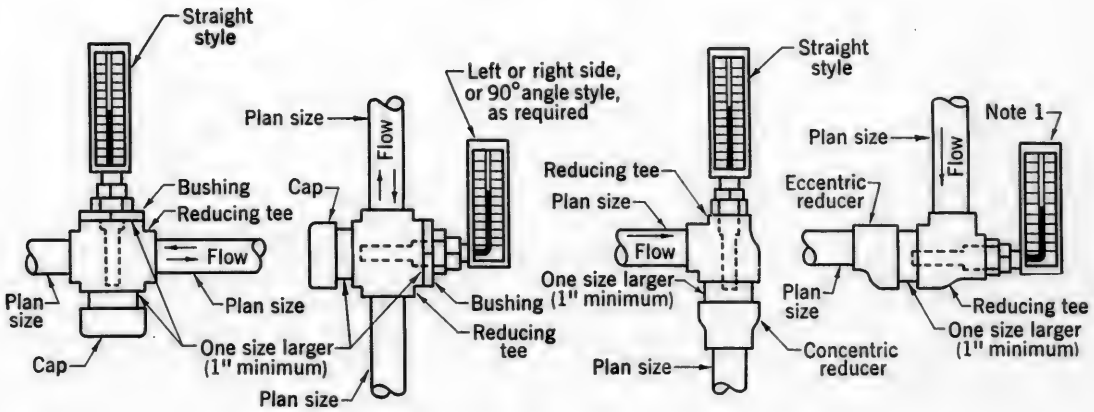


"ETERNALLY YOURS." Although twelve years old, this 31-min black and white film is still playing to "packed houses," according to the producer, A. M. Byers Co., Pittsburgh, Pa. Acclaimed for authenticity of script and costume, the film traces the history of wrought iron manufacture through the ages. It is available for showing to non-technical as well as technical groups.

PIPING DETAILS FOR THERMOMETERS



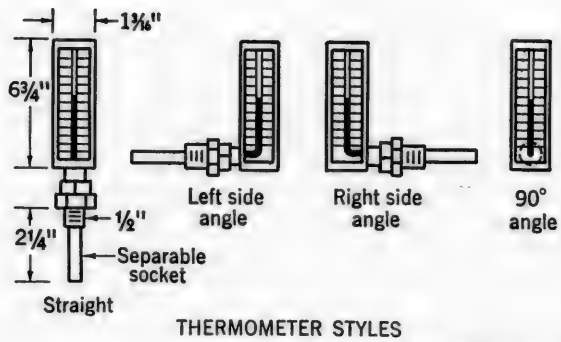
THERMOMETER INSTALLATION WITH PIPING 1½ INCH DIA AND LARGER



THERMOMETER INSTALLATION WITH PIPING 1¼ INCH DIA AND SMALLER

Note 1. Left or right side, or 90° angle style, as required.

Flow in pipe can be down as shown, or up with the reducing tee turned 180°

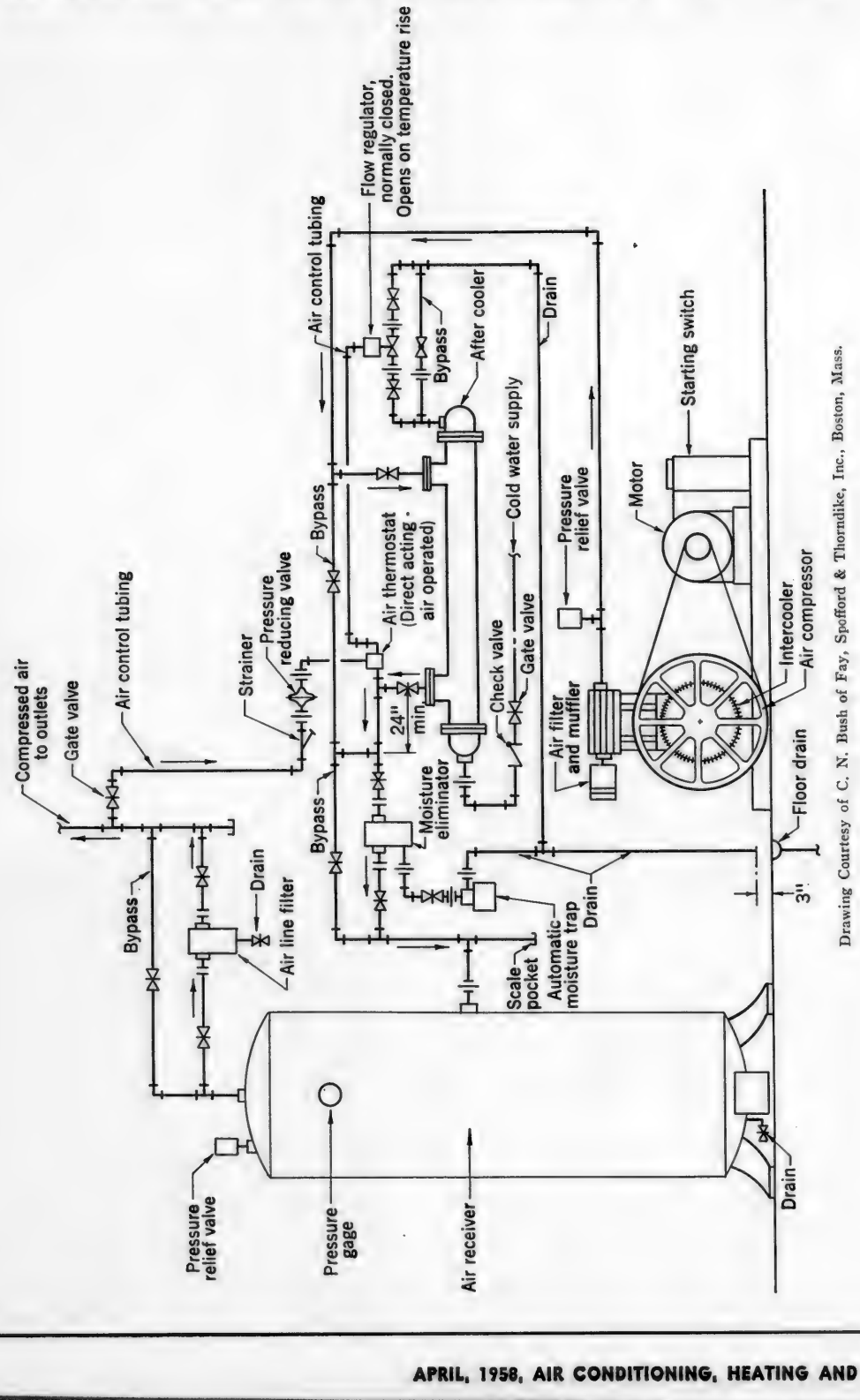


THERMOMETER STYLES

Drawings Courtesy of M. F. Hoppe, Consulting Engineer, Washington, D. C.

HOOKUP FOR AIR COMPRESSOR

AIR COOLED UNIT WITH WATER COOLED AFTERCOOLER



Drawing Courtesy of C. N. Bush of Fay, Spofford & Thorndike, Inc., Boston, Mass.

Designing Out the Kinks

In Refrigeration Systems—Part 2

M. A. RAMSEY
Engineer, Worthington Corp., East Orange, N. J.

This concluding section starts with a discussion of the prevention of liquid refrigerant carry-over to the compressor, its causes and remedies. Maintenance of proper oil concentration in the evaporator, design of systems for unusual conditions, and expansion valves are detailed.

Much of the circulating of refrigeration systems is arranged with the main thought being that of assured oil return. While it is important that oil be returned at a reasonably constant rate, it is fully as important that the circuiting to assure oil return does not also assure a generous return of liquid refrigerant to the compressor.

If a refrigerating system can start up from a pumped-down condition and if it operates always at the same capacity, and if it is again pumped down before the compressor is stopped or its capacity changed, there will be little trouble unless some control fails or the design is extremely bad. However, such conditions of operation do not normally apply and the circuit must be designed so as to function properly at varying loads and with intermittent operation.

When Liquid Enters Evaporator at Top—Much application data show direct expansion evaporators with the liquid entering the top and the gas leaving at the bottom. This does assure that oil will not stay in the evaporator, but it also makes it reasonably certain that with anything but continuous, constant-capacity operation, liquid will return with the suction. During steady operation, with no capacity variation, the expansion valve will feed liquid at such a rate that at the end of the circuit there is a practically liquid-free surface, so that there exists the degree of superheat that the valve is set to maintain. If the compressor stops, the pressure in the evaporator will rise to correspond with the temperature surrounding it, and this condition is likely to be reached without all of the liquid in the evaporator becoming gas. The remainder of the liquid will run down to the bottom of the evaporator and possibly directly to the compressor suction and into the crankcase. The crankcase heater may evaporate it so that it can condense again in the same part of the suction line or evaporator and run back. The crankcase heater is like the boiler in a one-pipe steam heating system, and the suction line or any part of the evaporator that is below the crankcase temperature will be the radiator which condenses the steam and returns it to the boiler.

Should the evaporator be lower than the compressor, or if a loop is made, as shown in Fig. 4, the remaining liquid may fill a section of the circuit, as shown. It will not run back to the compressor. If the temperature of the liquid is higher than the temperature at some other point in the suction line or compressor, and the surrounding temperatures maintain the liquid in that condition, then the liquid will evaporate and condense in the compressor or the suction line from where, if the circuit permits, it may flow to the compressor by gravity.

If such temperature conditions do not exist, the liquid will remain as shown in Fig. 4 until the compressor again starts, whereupon the increase in volume of the gas in the upper part of the evaporator and the flash of part of the liquid at the bottom will cause the remainder to take a quick passage to the compressor. With the pressure differences existing, *no practical height of loop will be of any particular value in preventing this carry-over of liquid.* If the vertical line were sufficiently large in size, the liquid would not return, but a line of such size would prevent oil return just as effectively. Any arrangement of piping alone which results in good oil return will, for the same reason, result in good liquid return.

In other words, I believe that, although this has been a common way of connecting evaporators during the last few years, it is not a proper way of arranging the circuit. As a contractor, I was responsible for the installation of a rather large number of direct expansion evaporators and, with one exception, they were all fed at the bottom and the suction was taken from the highest point. None of these gave any trouble with respect to oil return. The one with the feed at the top and a loop about, as shown in Fig. 4, had a slight carry-over of liquid each time the compressor started and a suction trap was required to eliminate the difficulty.

Evaporators Fed from the Bottom—Figure 5 shows the approximate condition of an evaporator fed from the bottom, during a period when the compressor is not operating. With this condition there is no tendency for the liquid to run down to the compressor. On restarting, the liquid will boil and tend to nearly fill the evaporator, restoring the evaporator to just about the condition in which it was when previously in operation. It could not

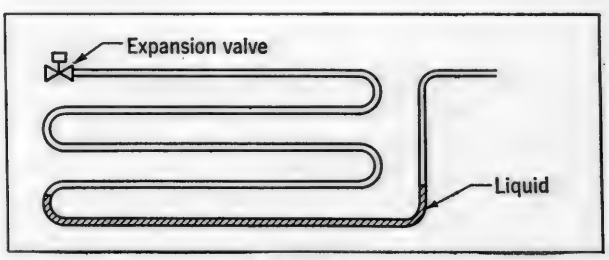


FIG. 4

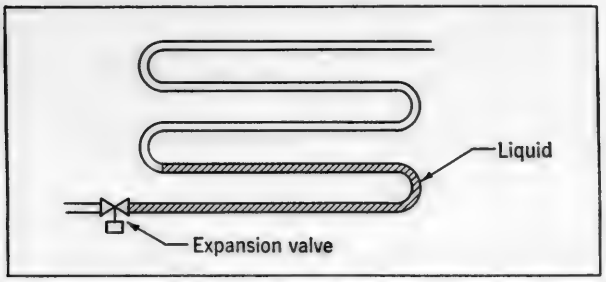


FIG. 5

overflow unless the rate of gas removal is appreciably higher than during the last period of compressor operation. Oil return should be perfectly satisfactory because oil could certainly not flow back against the flow of refrigerant in the evaporator. Any tendency to concentrate the oil in the upper part of the coil will raise the boiling point, causing higher temperatures, with the result that the expansion valve will feed at a higher rate and push the oil out.

Vertical Units—The evaporator in a vertical air handling unit, with air flow up through the coil, cannot generally be circuited with the refrigerant feed at the bottom and the suction from the top because this would result in the leaving refrigerant in contact with the leaving air, resulting in a temperature difference too small to provide the necessary superheat. This would reduce the amount of surface containing liquid and lower the suction pressure. The importance of this would depend on the relative temperatures of the entering and leaving air and the boiling refrigerant.

If the coil in such a unit used an upfeed refrigerant circuit, the necessary superheat could be obtained from the warm liquid, as shown in Fig. 6. The heat exchanger shown should be of a type having a small suction-side volume so that little liquid can be contained in it. This type of circuit also will result in improved heat transfer, the extent of which will vary with the pressure drop of the refrigerant through the coil.

Multiple Circuits—Many coils are used with multiple, nearly horizontal circuits, connected to a common suction header, as shown in Fig. 7. The suction connection shown in solid lines will be least likely to send liquid back to the compressor. The oil return should be at least reasonably satisfactory, because the only place it could accumulate is in the suction header itself. It could not accumulate in the coil tubes because they are usually of too small a diameter to permit gas to bubble through oil. If some oil does accumulate in the lower part of the suction header, it will do no harm there. If, with varying capacities, the amount of oil in the suction header changes, it will have some effect on the crankcase oil level but, normally, the relative sizes of the suction header and the crankcase are such that the effect would be of no importance.

Although in general, feeding the evaporator from the bottom to the top has advantages over feeding in the opposite direction, this alone will not eliminate liquid carry-over to the compressor. If, with the compressor not operating, the temperature of the evaporator is higher than some part of the suction line or the compressor, the liquid will evaporate and condense again in the coldest point. If this is some part of the suction line where the pitch is back toward the evaporator, the condensed liquid would run *back* but, if the point at which the condensation takes place is such that the pitch is from that point down toward the compressor, the liquid will run *into* it. If it condenses in a low point of the suction which might serve as a trap, restarting will carry it back to the compressor just as in Fig. 4.

When Boiling Rate Varies—Another cause of liquid carry-over is the variation of boiling rate in the evaporator. This can be caused by an increase in the temperature of the material being cooled, an increase in the flow rate of the fluid being cooled, or an increase in the compressor capacity, or some combination of these factors.

For example, an evaporator may be cooling water from 50 to 40 deg and the incoming water may rise quickly to 55 or 60 deg. The water flow may be at 50 gpm and rise rather rapidly to 75 gpm. Either of these cases will probably actuate controls to increase the compressor capacity, or the compressor capacity might change because of some other control, even through flow rate and temperatures of the fluid being cooled have remained fairly constant. Any one of these will cause an increase in the refrigerant boiling rate and the level in the evaporator will rise appreciably.

As an illustration of the effect, imagine that a pan of water is on a burner and that the water is boiling. The burner is low and water is added gradually, while boiling continues, until the level is nearly at the top of the pan, but none of the water passes over the top. Now the burner is suddenly turned up to about double the heat output and the addition of water is stopped at about the same instant. The water will, of course, slop over the top of the pan.

Exactly the same thing will happen in any evaporator when the boiling rate suddenly increases, and it will increase instantaneously in many cases. A change from 25 to 50% compressor capacity is a 100% increase. A control valve may change and increase the temperature

FIG. 6

FIG. 7

of liquid returning to be cooled or the rate of circulation may increase. The rise in temperature entering the cooler will add to the load and some controls immediately add to the compressor capacity to try to hold the leaving temperature constant.

It is certain that in almost all jobs there will be a variable rate of boiling, with the result that the liquid level will change. The expansion valve (no matter what type) can do nothing about this. If the expansion valve is controlled by liquid level or superheat, it will close as soon as the level rises or the superheat falls sufficiently. Nevertheless the level of the liquid will get nearer the suction because that weight of liquid was already in the evaporator and the expansion valve cannot take it out. It must boil away, even if it slops over before it does so.

There are several ways in which this change in level can be kept from sending liquid to the compressor. Some of these will be applicable to some installations and some to others.

1. The refrigerant charge may be so limited that the evaporator will operate with the normal level or superheat only when the load is at the maximum or design conditions. This will result in some gas going through the expansion valve at part capacity (unless it is a high pressure float) which does not make for the highest efficiency but, in many cases, the efficiency at partial capacity is of very secondary importance.

This method of avoiding carry-over is of value only in those cases having a single evaporator and expansion valve in the circuit, because with more than one evaporator there is no assurance that one will not have most of the liquid and thus slop over on increased load.

2. With a flooded evaporator the surge space or surge drum may be large enough to hold the increased volume when the load increases, without letting it reach the suction line.

3. A suction trap of adequate capacity may be installed between the evaporator and the compressor. It should be as near as possible to the compressor so that the suction line between the trap and the compressor is as short as possible. Since, in most cases, this part of the suction line will drop to the compressor, it should be certain that no part of the line or the compressor will have a lower temperature than the suction trap while the system is not operating. Otherwise, any liquid in the trap would evaporate and condense between the trap and the compressor. Locating the trap below the compressor suction with the suction line having a continuous drain back to the trap would have some advantages as far as liquid is concerned, but would make gravity return of oil impossible. The low position of the trap would, therefore, be practical only in those cases where a separate oil return pump is used for other reasons.

The suction trap will accumulate oil continuously and liquid refrigerant at a varying rate. The refrigerant must be evaporated and returned to the compressor as a gas. The oil, at a temperature several degrees above that corresponding to saturation at the existing pressure, should be returned *directly to the crankcase*, if convenient. In the case of compressors having the crankcase pressure about the same as the suction, this oil can normally return by gravity. The flow of oil to the crankcase can easily be controlled by a standard superheat control expansion valve with an orifice size sufficient to take care of the capacity with the very small pressure drop available. See Fig. 8. If the compressor is a two-stage machine with the crankcase at intermediate pressure, the oil must be returned to the suction line where it drops to the compressor (unless a special oil return system is used).

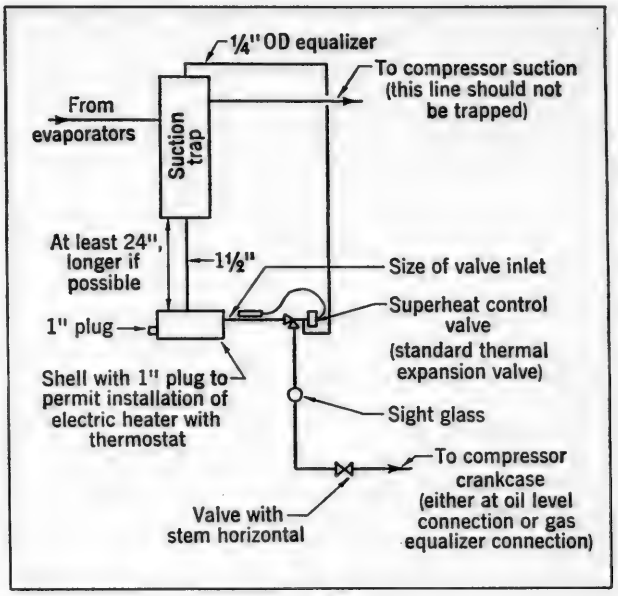

1/4" OD equalizer
To compressor suction (this line should not be trapped)
From evaporators
Suction trap
At least 24", longer if possible
1½"
Size of valve inlet
1" plug
Superheat control valve (standard thermal expansion valve)
Shell with 1" plug to permit installation of electric heater with thermostat
Sight glass
To compressor crankcase (either at oil level connection or gas equalizer connection)
Valve with stem horizontal

FIG. 8

It is very important to avoid undrained traps in the suction line because oil may accumulate in them at low gas velocity and be carried back quickly on a sudden increase in gas velocity.

If there is an accumulation of refrigerant in the suction trap, such that the heat from the ambient does not evaporate it sufficiently rapidly, an outside source of heat is required. The heat may be supplied by the warm liquid from the receiver or the relatively warm liquid from the sub-cooler, or it may be supplied electrically. Care should be taken in the design of the heating arrangement to assure heating from the low point of the accumulated liquid and to permit the gas rising without carrying the liquid up with it. The heater should be in the bottom of the suction trap or in a vessel below the trap and connected to it by a *vertical* line of at least 1½-inch diameter. Otherwise, poor operation with possible surging and reduction of column height needed for return of oil may result.

Velocity in Vertical Suction Lines

There has been a common practice of maintaining a particular velocity in suction lines which are vertical or which pitch up, in order to assure that the oil will be carried along by the suction. Obviously, the velocity alone is not the factor which determines this. The density of the gas will certainly influence the tendency to move the oil along the pipe. My own feeling is that the friction, since it indicates the dragging effect on the

walls of the tube, is the nearest approach to a determining factor. It is much the reverse of the problem in one-pipe steam heating systems where the rate of flow must be low enough to permit the condensate to return against the steam flow. Tables of condensate against the flow of the rising steam indicate that the capacity has a reasonably direct parallel with friction of the steam in the pipe. Of course, lower velocities are required if the pipe is not vertical but merely pitching up in the direction of steam flow while the condensate is to flow back against the steam.

Probably the temperature and type of oil will have some effect on the ability of the refrigerant gas to carry it along. This would seem a useful field for some research, and it should be relatively inexpensive in equipment required.

Double suction lines are often used to assure lifting the oil at partial loads. However, such a piping arrangement requires the formation of a seal at certain loads. This seal is an accumulation of oil or liquid refrigerant (or a mixture) and this mass is likely to be carried over instantly on a change in compressor capacity. With potential sources of accumulations of liquid reaching the compressor, such as this or others, a suction trap or knockout drum may be necessary to assure that the liquid refrigerant evaporates and returns to the compressor as a gas and the oil returns directly to the crankcase or gradually to the suction of the compressor.

Evaporator Oil Concentration—Flooded Systems

Flooded system oil recovery by means of a continuous bleed of a sample of the refrigerant in the evaporators, boiling off the refrigerant, sending it back to the compressor as a gas and returning the relatively refrigerant-free oil back to the crankcase (or to the suction, if the crankcase is not at suction pressure) is a rather well known method of keeping the concentration of oil in the evaporator at a reasonably low point. The heat may be supplied by some outside source, or by warm liquid from the receiver, or relatively warm liquid from the sub-cooler. If the heat comes from the refrigerant liquid, it has the advantage that no heat is added to the system to reduce its useful capacity and the heat exchanger can be rather generous to get very good return with no thermodynamic losses as a result.

The heat exchanger should be so designed that the warmed refrigerant will continuously rise, circulating by gravity; and the relatively warmer liquid feed, on its way to the expansion valve, should be in good thermal contact with the other side of the exchanger so as to deliver sufficient heat to evaporate the refrigerant bled from the evaporator. There may be times when the lift seems too high or it is desired to have the flow continuously down from the evaporator through the heating unit to a down-flowing suction line or the crankcase. In that case, a superheat control valve should be installed between the heat exchanger and the suction line or the crankcase. The superheat control valve should preferably be installed with the flow through it in the usual direction, but the bulb is located on the line *entering* the valve (between the heating unit and the valves). The external equalizer should be connected to the top of the suction trap or to the side or top of the gas line entering or leaving the suction trap.

The refrigerant gas can be vented to the suction and the oil drained to the crankcase, if it is at suction pressure, or vented into the suction line at a point where it pitches toward the compressor.

Positive Oil Return

In some larger systems having compressors at different pressures, a positive system of oil return to each crankcase may be desirable. This can consist of a small receiver vented to the lowest suction pressure, to which all recovered oil drains. A small gear pump, with a seal, controlled by a float switch (these are rather low in cost), can take this oil to another small receiver kept at a pressure above the highest crankcase pressure, but below condensing pressure. A float switch on each crankcase would control a solenoid valve to regulate the feed of oil from the higher pressure oil receiver to its respective crankcase.

Unusual Conditions

In designing refrigeration systems, particularly those for unusual conditions, one should not overlook the fact that operation will not always be at design conditions. Temperatures must be brought down initially. Pressures or temperatures may rise during operation due to unexpected changes in load or difference in balance between stages. The system may be pumped down.

An example of what is meant is indicated by a cascade system which should operate with a suction pressure to the high stage machine at about 16 psig. Under these conditions the heat rejected is about 300,000 Btu per hr at 105-deg condensing. The evaporative condenser can dispose of about 325,000 Btu per hr at 75 w.b. while maintaining 105-deg condensing temperature. If the suction pressure rises to 24 psig, the heat rejected becomes 414,000 Btu per hr and at 33 psig it becomes 543,000 Btu per hr. A larger evaporative condenser would take care of the system, but if this condition applies only occasionally, that is probably an expensive solution. The high pressure cut-out should stop the compressor, but it may be awkward and take time to manually get into operation without frequent cutouts. A pressure reducing valve to maintain a 16-psig maximum pressure at the compressor suction would be one way of taking care of the problem. A second pressure switch in the compressor discharge, to reduce the capacity to 50% at some pressure just under the usual high pressure cut-out point, might be another method.

Manual Operation

Thought should be given to the *whole* operation so that difficult operating problems do not occur. When *manual* and *automatic* switches are provided, *all* safety controls should still be in the circuit during *manual* operation. Any means of operation which cuts out any safety controls should be one requiring maintenance of pressure on a push button in order to obtain operation, and even that should omit only those safety controls which must be omitted. The operator should know what those are so that he can keep careful watch of the pressures or temperatures which affected the omitted controls.

Valve Sizing

In choosing valves for control of flow, the size selection should be made to obtain the flow at the desired pressure drop. The size of the line in which the valve is to be installed should in no way influence the choice of valve size.

In some cases, the valve may be required to have a very high pressure drop during some periods, such as the start-up, and almost no pressure drop with a lower inlet pressure at other times. To assure satisfactory operation, the valve manufacturer must be given the full data for both extremes. Two or more valves may be required to obtain the desired result.

Superheat Control Valves

Superheat control expansion valves often give poor results because their operation is poorly understood. (These are commonly called "thermal", "thermo" or "thermostatic" expansion valves, which are rather undescriptive names.)

1. These valves control flow to maintain superheat at a constant value at the point where the bulb is located. The valve can only open when that superheat exists and a heat source at a high enough temperature must be available to add the superheat without using most of the evaporator as superheat surface instead of evaporator surface.

2. A superheat control valve which has its superheat adjustment set at a particular point will maintain a certain number of degrees superheat only at a particular pressure. The valve opens due to a difference between the pressure above the diaphragm, corresponding to bulb temperature, and that below the diaphragm which is the pressure in the suction line at a point near the location of the bulb.

If a refrigerant-12 valve is so set that it maintains a 10-deg superheat when the suction pressure corresponds to 50 deg F, it will maintain:

11 deg	superheat at	40 deg suction
14 deg	superheat at	20 deg suction
18 deg	superheat at	0 deg suction
24 deg	superheat at	—20 deg suction
32 deg	superheat at	—40 deg suction

Certain cross-charges may modify this somewhat, but there will certainly be a difference.

The bulb of an expansion valve is likely to contact the suction pipe over an extremely small area, practically a line contact. Therefore, the heat transfer is mostly through the straps which should be of a good conducting material, such as aluminum or copper, of reasonable cross sections, and soft enough to form well to the pipe and bulb for good contact. Friction tape or wire are most unsatisfactory materials for application of the bulb to the pipe.

Since the straps are the important contact with the pipe and the first liquid is likely to get to the bottom of the pipe, the location of the bulb should be as near the bottom of the pipe as possible without keeping the straps from making good contact with the bottom.

Mounting the bulb inside of the suction line may give better results, but under some conditions the control may be much poorer with internal bulb than with one mounted on the outside of the pipe. Any liquid running along the bottom of the pipe or carried as a mist, must quickly change the temperature of the bulb.

Englishmen and Europeans Cooperate on Heating and Ventilation Research

In 1951, while several researchers in heating and ventilating problems were in London for the Building Research Congress, there was formed the Informal Study Group on Heating and Ventilation. Its purpose, then, as now, was not to act as a clearing house for data; rather it was to provide an avenue for cooperation on research among workers in various countries. At its last meeting, members attended from Austria, Belgium, Britain, Denmark, France, West Germany, Holland, Norway, and Sweden.

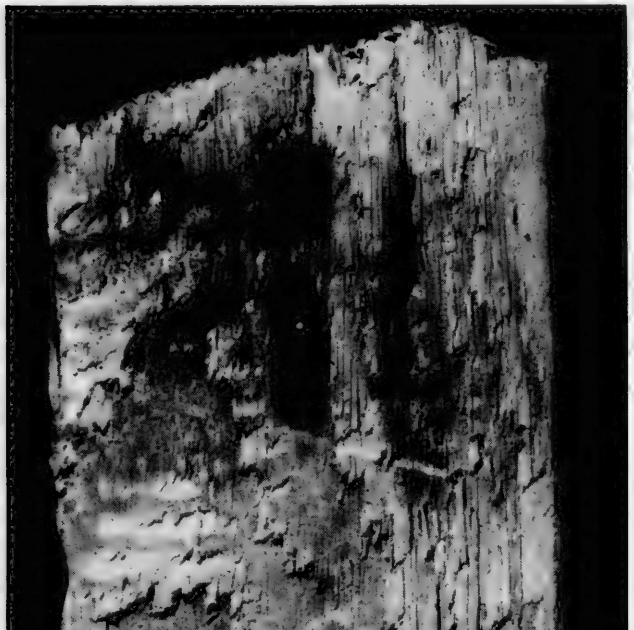
The Group has met at intervals of 18 months to two years. As explained by J. B. Dick, a member of the institution of Heating and Ventilating Engineers, writing in The Industrial Heating Engineer, London, January, 1958, subjects chosen for discussion may be those involving items on which research effort is currently being expended in one of the countries, or a subject may be chosen because of the recognized difficulty in reaching a satisfactory solution. An example of the former is "heating requirements of dwellings"; of the latter, "intermittent heating".

At these meetings, the members have an opportunity to become acquainted with the projects being undertaken by their counterparts in foreign laboratories. It may be that researchers in one country will delay their work on a particular item until the results of similar work are available, to avoid duplication.

Techniques of research—methods of measurement of moisture content of building materials, for example—are discussed. Mr. Dick also cites, as an example of analytical techniques that are reviewed, the use of statistical methods of analysis to determine the significance and reliability of the results of heating trials in the field.

From time to time items of specialized interest arise that are handled by smaller sub-groups of specialists. One such meeting, the author states, was arranged to discuss the methods to be used to measure the thermal conductivity of moist materials. These meetings are particularly valuable because the problems may be quite complex, and because there probably will be little published material on the subject.

The Group was originally formed by people who were mainly interested in the building research aspects, we are told, but when the International Council for Building Research Studies and Documentation was formed about two years after inauguration of the Group, the Experimental Section of the Council recognized the Group as a body working on international cooperation in heating and ventilation research. Since its formation, however, the membership of the Group has extended and it now includes members who are more concerned with the engineering aspects.



How the Labs Fight Rot

M. M. FETKOVICH
Hall Laboratories Division
Hagan Chemicals & Controls, Inc.
Pittsburgh, Pa.

Section of native cedar, at extreme left, shows severe erosion, caused by surface soft rot and the physical force of running water. Sample at right shows severe checking, is bereft of all structural strength.

Water cooling tower deterioration, caused by fungal attack of wood components, is becoming an increasingly serious problem in the maintenance of water supply systems. Previously, this problem was not recognized. When a cooling tower failed, it was assumed to be a result of chemical attack and "weathering." Now, improved laboratory techniques make possible a more scientific approach to the problem, as is outlined below.

PERIODIC microbiological examinations of wood from water cooling towers is the best way to keep the towers in the best possible condition. The primary purpose of the examination is to determine whether a cooling tower is in danger of serious attack by fungi. Early stages of deterioration are not always visible to the eye.

Laboratory examination of possible fungal growth in wood from water cooling towers involves:

1. Cutting thin sections of the wood on an instrument called a microtome, followed by microscopic examination of the wood sections. Many tell-tale signs are visible if typical infection is underway. For instance, cellulose in wood cells disappear as a result of being dissolved by fungi, leaving scars on the wall. Also, the presence of bore holes indicates penetration of cell walls by fungi hyphae (threadlike elements of fungi);

2. Culturing small sections of the wood to detect living fungus.

Is It Alive?

However, the presence of fungi is not sufficient evidence from which to draw conclusions. The important question is whether the fungi are *living*. To find out, cultures are grown in laboratory media. The samples are taken aseptically from subsurface locations and incubated a minimum of four weeks. Fungi which attack wood have growth characteristics that are looked for in the cultures. Growth of a colony in laboratory media is proof that organisms are living. If typical, live fungi are found and rot features are observed microscopically, a hazard exists. Preventive measures should be undertaken.

If testing shows that wood destruction is occurring because of fungi infection there is much that can be done in the way of preventive protection. Perhaps the most

successful of these fungi-preventing measures is double diffusion. Double diffusion treatment involves:

1. Spraying the cooling tower with a slurry of copper sulfate or zinc sulfate, which is allowed to diffuse into water-logged wood for several days;
2. Applying a second slurry of sodium chromate.

Reaction of the copper (or zinc) sulfate with the sodium chromate causes a precipitate of copper (or zinc) chromate to form, which is highly toxic to wood-destroying fungi. The precipitate forms within the wood as well as on the surface. We always recommend zinc sulfate for the double diffusion treatment because of the corrosion resulting from copper which would be carried over to the more expensive metal parts of the system.

Visual Inspection

It is important for those responsible for tower maintenance to remember, prior to microbiological examination, that it is easy to examine wood visually for indications of attack by fungi. Monthly checks should be made of typical rot features, such as surface checking and softening, brashness (wood breaks straight across under pressure, instead of uneven and ragged), and internal discoloration. Visual inspection can be made by merely removing a slat and examining it visually. It can be sawed in half to see the inner part. Or, the slat can be examined right in the tower by probing with a pen knife and following through with visual inspection. Laboratory work is vital as a follow-up to these visual observations.

Some types of rot start inside wood and work out. These are pocket rots that initiate deterioration with softening in the center of slats. Extensive eroding along growth lines usually is not a result of the physical action of water alone. It is the combined force of running water and fungal infection. Wood fibers are loosened by the action of the fungi and washed away by water, leaving the surface uneven, and thickness of wood seriously affected. However, it is important to remember that checking may also be the result of heat and that some erosion may be caused by water alone.

Air-borne fungi can penetrate wood and begin attack at any time. If infection is detected early, the cooling tower may be treated and last much longer.

All parts of the water cooling tower should receive thorough inspection. The worst pieces of wood should not necessarily be those tested, although they are of some value for visual examination. In many cases, a badly rotted piece of wood will not show living, wood-rotting organisms even though it be apparent visually and microscopically that biological degradation has taken place. It is not illogical to expect that the fungi will seek a more suitable environment when available nutrients in one section of wood are exhausted. Because of this, it is much better to select a number of representative samples from all parts of the water cooling tower.

Looks Can Be Deceiving

At our laboratory there have been many interesting samples submitted for testing. The worst case of wood rot submitted to us came from Venezuela. Tropical climate encouraged complete and rapid deterioration of the wood. Although the infection was of a kind usually associated with surface rot, which moves relatively slowly through wood, the samples were decayed to a point where a finger touch caused the wood to crumble. Wood for the water towers was native cedar.

Most samples from cooling towers in the United States have not shown severe damage. Infections have been diagnosed in time to allow treatment of the towers so that they will be in service for years in the future. One set of samples showed no external signs of decay at all, except a slight discoloration of the wood when cut in cross section. Under microscopic examination, however, large numbers of hyphae were seen in a stained section and prolific growth appeared in culture. The company submitting the samples was provided test results in ample time to allow preventive measures to be taken.

Interpreting results of microbiological examination requires the consideration of many factors. Conclusive evidence is not always found. Should this be the case in wood from a particular tower, findings of the analysis are presented, possibilities stated and recommendations are made for further microbiological testing. A series of investigations is not wasted effort. Rather, the series of tests serves as a point of reference. As is always the case when dealing with biological matters, a number of tests over a long period provides more valuable information than a single examination.

Vast Antarctic Solar Resources Go to Waste

During the summer the South Polar plateau receives more solar energy than any other place on earth. However, between 84 and 93% of the solar energy is lost because of reflection from the snow on the ground. These observations, as reported in *The New York Times*, were made by Dr. Herfried C. Hoinkes of the University of Innsbruck, Austria, when interviewed at McMurdo Sound, Antarctica.

Dr. Hoinkes has found that the average solar intensity there is 1.5 calories per square centimeter per minute.

[This compares with a figure of 1.4 for Albuquerque, N. M. Also if we compare total daily radiation, it is found that 1.5 calories per square centimeter per minute during the 24-hour Antarctic summer day is approximately 8,000 Btu per sq ft per day, while The Association for Applied Solar Energy, Phoenix, Ariz., gives a figure slightly under 3,000 Btu per sq ft per day for Albuquerque, N. M., in June.]

The polar surface is the most reflective surface known to the glaciologists, whose term for the snow's reflectivity is *albedo*. The albedo rating for Antarctica ranges from 84 to 93%. Values above 90% anywhere on earth are very rare, except for new snowfall.

Therefore, at most, 16% of the sun's heat is retained by the snow cap, and most of that is in the first two feet of depth. Dr. Hoinkes has shown that the shortest wavelengths penetrate about 22 inches. The temperature of the air is never above freezing, and the sun is absent six months of every year. The result is that the solar ice cap is not shrinking, and the ice age is here to stay.

Solar heating is Antarctica is not feasible, Dr. Hoinkes says, because there are not enough clear days.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Suction Tanks

EACH time the erection of a new building is contemplated in many of our large cities, one of the first questions facing the engineer is: Are the existing water facilities of adequate size to supply the building with a sufficient quantity of water and are the sanitary and storm facilities large enough to receive the sanitary and storm load imposed upon it? Cities have grown in size; taller building have replaced smaller ones. In addition, greater quantities of water are needed for the new buildings.

New Buildings

New buildings are taller than the ones they have replaced. Many new 20, 40 and 60-story office buildings are erected on sites where 10, 15 or 20-story buildings were standing for many years.

The current trend has been rather prevalent throughout the country. Since space is at a premium in many cities, the expansion required to meet the ever-pressing needs can only cause the buildings to rise higher and higher. Since this trend is evidently here to stay, the engineer must accept it and consider ways and means for supplying his building with an adequate supply of water.

Water Consumption

The water consumption per capita has more than doubled in recent years, brought about by many factors. New buildings are equipped with more plumbing fixtures of all types which greatly add to the amount of water needed. Since an office building is used for example in this article, reference will be made to this type of multistory design.

New office buildings, by necessity, now have many more toilet room fixtures than the old structures. This constitutes good design and the proper number of fixtures in the toilet rooms adds to the morale of the office workers. In addition, executives in modern office buildings insist on their own private toilet and shower facilities. The large kitchens and cafeterias in the building also require substantial amounts of water. Drinking water systems and many other needs, place a heavy demand on the water supply. Last but far from least, the air conditioning requirements in a modern office building calls for an enormous quantity of water. Therefore, the water supply must be adequate to meet all these needs.

Existing Street Water Facilities

Many existing water systems are not nearly adequate for the demand imposed upon them. In many instances, these mains have been in service for 50 or more years. At the time they were installed, they were capable of serving the needs of the city during that particular time. At the time these mains were sized, provision was made for normal city growth for many years.

While the water works engineer planned well at that time, he never realized how fast his city would grow or how high the buildings would extend, nor the tremendous demand that air conditioning could make on the water supply. It is very difficult to replace existing piping because of subways, storm sewers, sanitary sewers, gas piping, fire mains, electric conduits, telephone, steam lines and other facilities that are also installed under the surface of the same street.

Methods of Water Supply

When an engineer encounters an existing water supply that is unreliable in pressure, he has several means at his disposal to ensure that his building is adequately supplied.

1. If the building is not too high, he may choose to include a booster pump supply system. This method supplements the water pressure when it drops below a prescribed limit. For example, if a 50 lb pressure

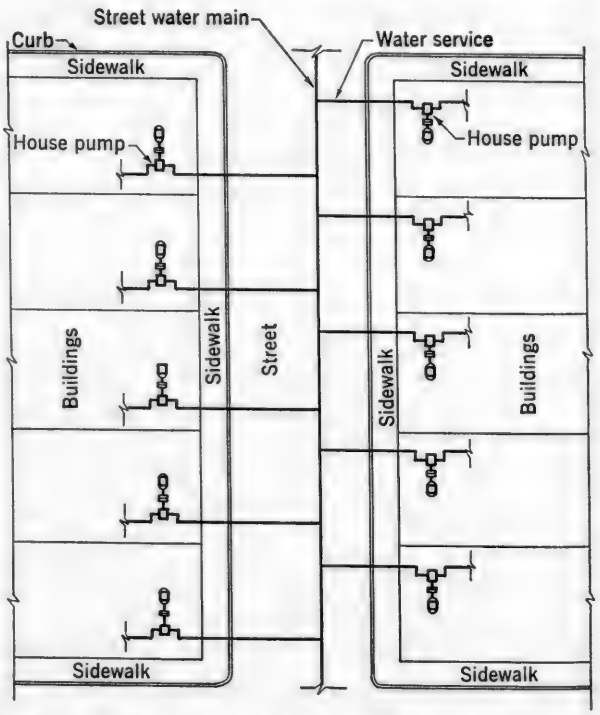


Fig. 1. Manner in which tall buildings facing a street have the house pumps connected to the street water main.

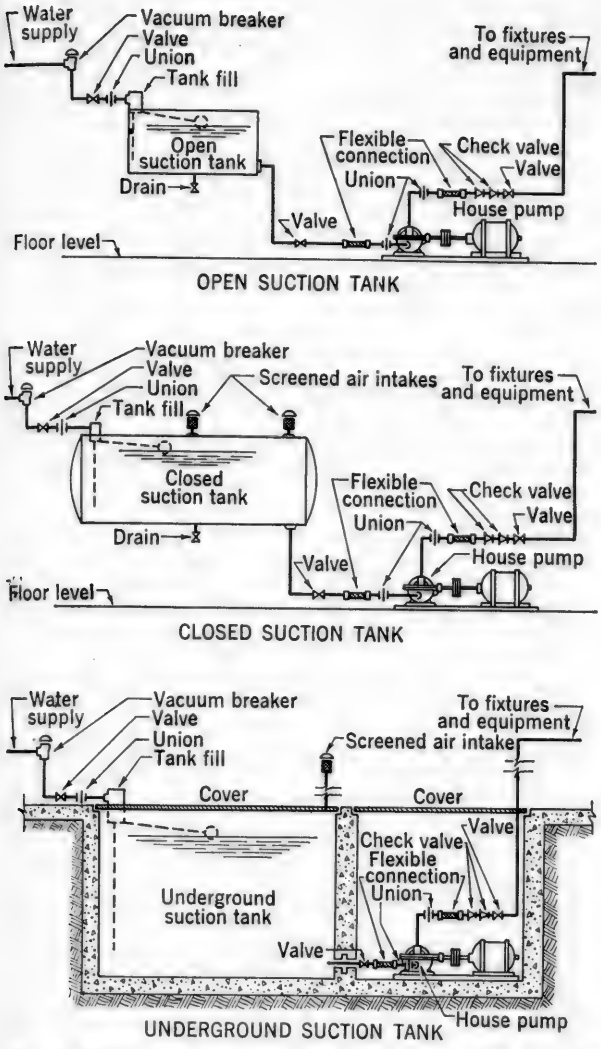


Fig. 2. Three different types of suction tanks that may be installed in a building.

is needed to amply serve all the fixtures in the building, including those on the highest floor level, it becomes imperative that this pressure be maintained at all times. The booster pump performs this service and will operate when the water pressure drops in the line serving the building. Although such fluctuations in pressure may last for a few moments or may be more prolonged, the booster pump will compensate for this pressure drop and will supply the required pressure until the street pressure is back to normal.

2. For a building larger in size, a pneumatic tank system can be used. In this system, water is pumped into a tank to a predetermined level. Compressed air that is maintained in the upper portion of the tank provides the force required to lift the water at the desired pressure and quantity to all portions of the building. Often, several pneumatic tanks are used in the building and may be placed at different building levels.
3. For tall buildings or buildings with heavy demands, a roof tank is generally employed. Here water is pumped up to the roof tank by pumps. The tank is usually sized to hold a water reserve for 20 to 30 minutes or more as desired. The roof tank, because of this reserve, compensates for any fluctuations in the street water pressure and thus provides a constant water supply.

These methods can be used where the street water pressure is inadequate to serve the needs of the building. In addition, these methods described are also used where some fluctuation exists in the street pressure so that the engineer may regard the service unreliable and attempt to compensate for the fluctuations.

Inadequate Water Service

In some areas, the water supply and pressure are so uncertain that it is impossible for the engineer to depend upon the supply alone. Moreover, he cannot draw water from street mains with his pumps to any reliable degree because other nearby buildings are also depending upon their pumping equipment to deliver their water needs from the street mains. To safeguard his client and the persons that will occupy the building, the engineer must consider a different means of providing an adequate water supply. Figure 1 illustrates this typical condition, which generally calls for the use of a suction or surge tank. Since this is a diagram, equipment, valves and other necessary devices that are part of this type installation, are not shown.

Suction Tanks

There are a number of types of suction tanks that may be used. Figure 2 represents just three types and their special applications are noted.

The three types illustrated are known as the open suction tank, the closed suction tank, and the underground suction tank. Piping arrangements shown are diagrammatic and they are not intended to include all

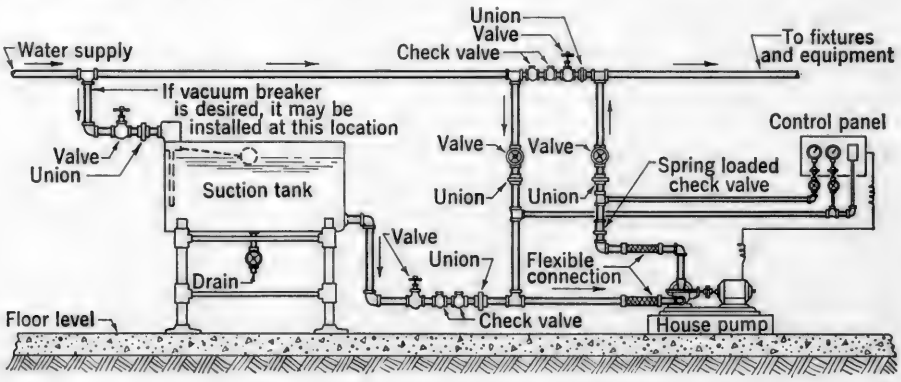
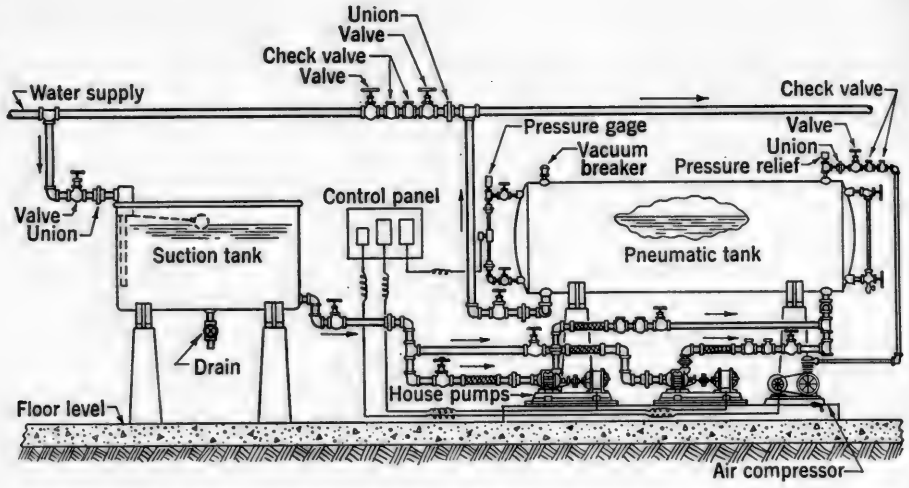


Fig. 3. How a suction tank can be used with a booster tank system.

Fig. 4. Piping arrangement for a suction tank used with a pneumatic tank system.



the component equipment or devices that may be utilized with each system.

The open suction tank, as its name implies, may be open on top or may include a cover. If a tight fitting cover is used, some provision as a screened air intake must be added to assure a balance of air in the tank. Screened air intakes are also used where a closed type suction tank is installed.

The underground suction tank is used when needed to satisfy the requirements of the project or where it is desired to save space in the equipment room by placing the suction tank and the pumping equipment underground.

In addition to these methods there are other arrangements that may also be used to suit the specific needs of the building.

Purpose of Suction Tanks

Suction tanks hold a reserve of water for the pumping equipment. Instead of the pumps drawing water directly from a street main, they will pull the water from the tank. Here is how this system works.

The water service fills the tank until a prescribed tank level is reached. A ballcock or system of floats is used to automatically control the height of the water in the tank. The type of equipment or devices furnished to control the operation of the tank is generally of type each engineer favors.

The proposed size of the suction tank is commonly determined by information regarding the adequacy of the street water mains that the local water company can supply. Otherwise it becomes necessary for the engineer to make an investigation to determine the size of his proposed equipment. The factors that determine the sizing of the suction tank will be discussed for each particular system as described.

Application of Suction Tanks

Three generally accepted methods for providing a constant water supply were covered earlier, using either booster pumps, a pneumatic tank system or a roof tank. Now it will be shown how each one of these systems can be installed in conjunction with a suction tank in areas where the water service is inadequate, and it is not practical to pump water from the street mains.

Booster Pump System

A typical arrangement of this system is shown in Fig. 3. Although this is diagrammatic, it shows the general placement of the suction tank, pump and piping. The engineer can use other methods. The water service, installed to bypass the suction tank and the pump, will serve the building needs as long as its pressure is adequate. A connection from the water service replenishes the reserve of water in the suction tank. A supply line from the suction tank is connected to the suction side of the pump as shown. The check valves placed on this line prevent water from the water service line from backing up and overflowing the suction tank. At the same time, these check valves are held in a closed position by the water service pressure acting upon them and prevent the water in the suction tank from draining into the system until needed.

When the pressure in the water service line drops below a prescribed limit, the pump operates and will draw upon the reserve of water in the suction tank. The size of the suction tank, in this instance, need only be large enough to make up the difference in the quantity of water required during periods of peak demand in the area. For example, this low ebb in water supply may occur during the noon hour when all the buildings in the area are exacting the heaviest toll from the street mains. Another peak period may occur from 4:30 to 5 p.m. The engineer must size the suction tank to satisfy his design requirements.

Pneumatic Tank System

Figure 4 shows how a pneumatic tank system can be installed, using a suction tank in conjunction with this arrangement. In this type system, the pumps draw water directly from the suction tank. Therefore, the suction tank must be of sufficient capacity to fulfill the demand needs of the pumps during their pumping cycle. For example, if the pumps supply water at a rate of 100 gpm to the pneumatic tank and the pump operates for say 10 minutes, a reserve of at least 1000 gallons is needed in the suction tank. However, since some factor of safety must be incorporated into the suction tank, it should be large enough to hold at least 1500 gal. Often it is advisable to double the capacity of the suction tank.

In any event, the factors that the engineer must consider

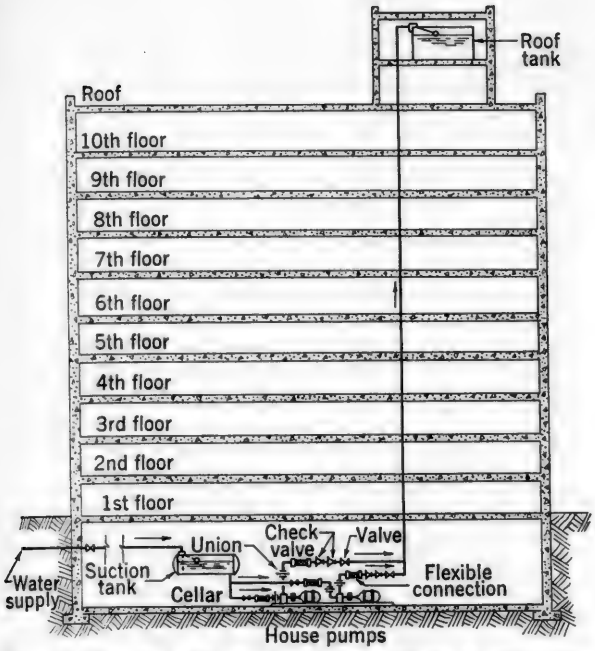


Fig. 5. Suction tank in basement serving a roof tank gravity system.

in sizing the suction tank are the cycling of the pumping equipment, and the rate at which the water service can replenish the suction tank during the peak demand periods of the day.

Although an open type suction tank has been used in this illustration, the closed type tank or the underground tank can be used with equal success. Moreover, the illustration shows the water service line bypassing the suction tank, pumps and pneumatic tank. This arrangement is for a situation where the service water pressure is used to its greatest extent in supplying the building needs. If this pressure is not needed, the control valves on this line can be closed which means that the system will be supplied only from the water contained in the suction tank. Here again, the particular arrangement of equipment, valves and devices is diagrammatic and has been shown for example only. Other methods can be used.

Roof Tank

When a roof tank system is employed, it may be installed in the manner shown in Figure 5. The pumps draw water directly from the suction tank and pump it up to the roof tank. The suction tank shown is the closed type even though other types of tanks may also be used. The size and capacity of the suction tank must be determined on the basis of the water service during peak demand periods of the day, as well as the capacity and cycling of the pumping equipment.

Next month, the article will cover the needs of very tall buildings and large construction sites—buildings higher than 20 stories.

Tragedy Occurs in a Tank

Two contractor's employees were killed due to exposure to scalding liquid and toxic gas released during removal of a blank flange from the base of a pressurized tank.

This large steam-heated tank, supported by a closed steel skirt which could be entered through one of two manholes, had been pumped down leaving a heel of about 600 gal of hot liquid. The gas had been run down to 25 psi gage and a temporary scaffold had been erected inside the skirt to permit access to the drain valve.

The vessel was being readied for hydrostatic test and internal inspection. The particular step under way at the time of the accident was removal of a blind flange on the 3-inch dia valve to be followed by attachment of a hose for transferring the liquid heel to drums. Two maintenance men had entered the skirt through the 18-inch dia manhole. Due to the small size of the manhole, it was necessary for the men to enter through the skirt without donning their self-contained breathing apparatus. One man mounted the scaffold, and using a flashlight for visibility, proceeded to remove the blind flange. Prior to this, movement of the valve had been tried by pulling on the chain wheel. It was found to be stuck and was evidently assumed to be closed.

Examination of the scene after the accident showed that four bolts had been removed from the flange and that the remaining four had been loosened although the man evidently had time to tighten one of the four after he noted the leak. The valve was open about three-fourths of an inch and the blind flange was cocked at an angle due to one tight bolt. This resulted in an opening on the opposite side of the snug bolt of about three-eighths of an inch between valve face and the tight flange. The gasket was gone on the half of the flange that was open. The liquid heel poured through this opening drenching both men in scalding liquid and was followed by the gas vented to atmospheric pressure.

The man at the ground level removed his mask to call for help and was overcome by gas before he was removed. In addition, he was burned by the hot liquid that had collected in the base of the supporting skirt. It was necessary to cut the self-contained breathing apparatus from the man before he could be drawn through the hole. He died the following day due to excessive inhalation of gas. The man on the scaffold fell to the ground and lay beneath the surface of the hot liquid which accumulated to a depth of approximately 15 inches in the skirt. He was burned seriously and his air tank was found to be empty. Death was primarily due to extensive burns.

The skirt was entered a few days later, after a thorough purging and enlargement of the manhole. The valve stem extension was cut off with a hacksaw, and the valve was removed for examination.

An elbow and a length of pipe will now be installed so that the valve and blind flange may be located outside the skirt. The undersized manholes will be enlarged. The relocation of the drain valves is to be carried out, not only on vessels where space inside the support is limited, but also on all process towers even though the openings into these supports are quite large.—PAUL C. ZIEMKE

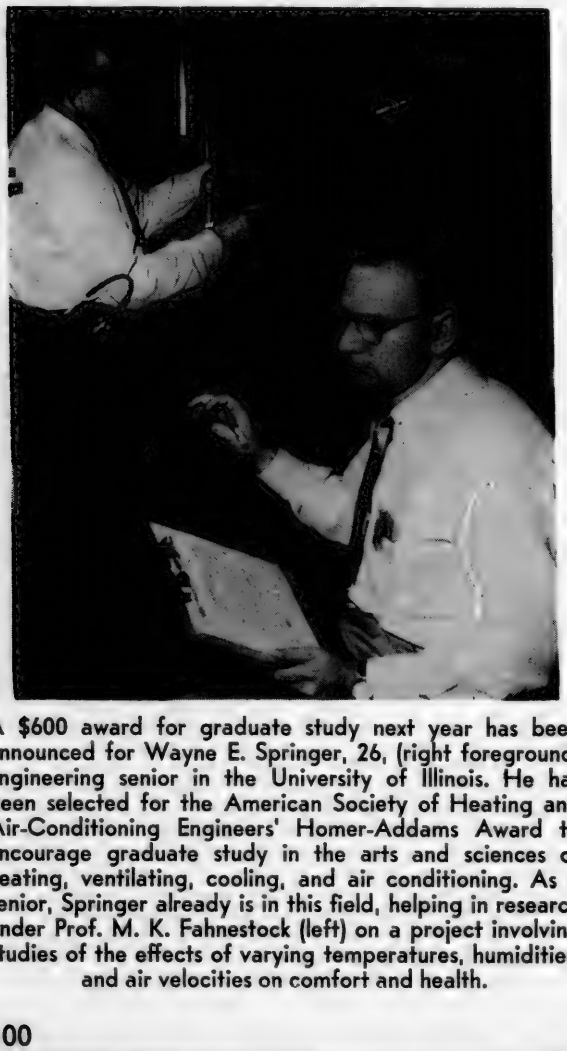
NEWS OF THE MONTH

EDUCATORS RECOMMEND

a four-point plan to increase the number of young teachers of engineering by spurring graduate study.

A plan to increase the number of young teachers for engineering schools of the United States has been presented to Dr. James R. Killian, Jr., the President's special assistant for science and technology, by The American Society for Engineering Education.

To encourage more good students to enter graduate study, the period during which most engineering students discover their interest in a teaching career, the ASEE states that basic research in engineering must be expanded and that federal agencies supporting basic research in engineering should greatly enlarge both the number and the amount of the grants. The increased amounts should cover the true costs, including the portion of the faculty salaries required to direct the projects. The contracts also should be for longer periods of time, such as five years, and should provide means for the construction or enlargement of the buildings required.



A $600 award for graduate study next year has been announced for Wayne E. Springer, 26, (right foreground) engineering senior in the University of Illinois. He has been selected for the American Society of Heating and Air-Conditioning Engineers' Homer-Addams Award to encourage graduate study in the arts and sciences of heating, ventilating, cooling, and air conditioning. As a senior, Springer already is in this field, helping in research under Prof. M. K. Fahnestock (left) on a project involving studies of the effects of varying temperatures, humidities, and air velocities on comfort and health.

• **PLAN OUTLINED**— With this as a fundamental premise, the four-point plan is:

1. A substantial increase in the number of National Science Foundation fellowships for first-year graduate study in engineering.
2. A program of secondary grants to those who fail to qualify for full fellowships under the National Science Foundation program.
3. Supplementary federal grants to holders of National Science Foundation fellowships who take part-time teaching assignments.
4. A new program of awards under the National Science Foundation to increase the financial aid to graduate students who combine teaching with their education and research experience.

ASEE calls particular attention to the important role of basic research in preparing engineering teachers. Federal support of basic research, the Society's report states, "will determine the supply of individuals with the requisite background to educate engineers in an age when basic understanding of scientific principles must replace dependence on intuition and experience".

RESIDENTIAL SALES

may become industrial and commercial air conditioning manufacturer's biggest item, company asserts.

Why is The Trane Co., La Crosse, Wis., entering the residential air conditioning field at this time? Answers to this and other questions that have arisen since announcement of its move was made are given in a fact sheet distributed by the company. The residential air conditioning market could be the firm's largest market (and this market is apt to experience rapid growth) is one of the answers given.

The company already manufactures the basic components used in the products that serve this market. It is explained further that it is the company's desire to offer as complete a line as possible and that sales promotion of the residential line should increase the stature of the company name with the general buying public and help the sale of its other product lines.

Sales will be handled through the firm's 96 offices in this country and by its 300 field engineers, in the same way as its other lines, while sales representatives are being added who will specialize in the packaged products. Also, the company states, the offices will most frequently sell directly to the installers of residential equipment.

The complete line has not as yet been revealed. However, it is stated that it will include upright furnaces for closet or basement installation with or without cooling, and add-on split cooling systems in 2, 3, and 5-ton sizes consisting of remote air-cooled compressors and condensers connected to cooling coils within the residences.

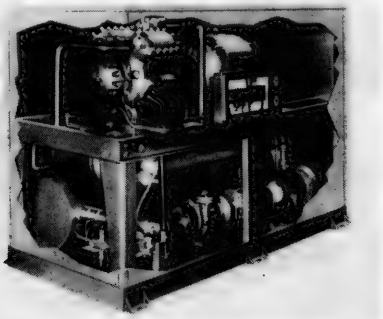
(News of the Month continued on page 142)

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on the last page for securing additional information about new equipment and materials described in this department.

Package Liquid Coolers

Bell & Gossett Co., Morton Grove, Ill., announces its newly designed package liquid coolers. Said to be the only units of their kind with all major components de-



signed, built, and guaranteed by one manufacturer, these refrigeration and air conditioning coolers are equipped with the company's products throughout. Sizes are available in a range from 7½ to 150 tons capacity.

The refrigeration compressor used on each unit has been designed and built by the company to give the utmost in modern refrigerant performance. The compressor motor is also a company product. By setting its own specifications subject to its own control in its own plant, the company reports efficiency, long life, and quiet operation heretofore unattainable in an electric motor-compressor combination.

More information? Circle Item 1, postcard, last page.

Radiant-Acoustical Ceiling

A radiant-acoustical ceiling system, introduced by Airtex Corp., Chicago, Ill., offers radiant heating and cooling along with noise reduction. The company asserts that its system is attractive, practicable, economical to install, and produces quiet, comfortable working conditions.

Design is based around a newly developed radiant panel made of solid aluminum in standard 12 by 24-inch sizes, which can be used in conjunction with standard acoustical tile. Use of lower cost acoustical tile will lower the cost of the ceiling. Furthermore, the entire ceiling, where the two tiles are used together, will perform a radiant heating function, since the acoustical material adjacent to the radiant panels also radiates.

In back of the radiant panels are thermal heat bridges. They contact water pipes installed above the panels. Water pipes are connected to square shape headers. Ceiling is supported by standard acoustical T-bars. Over 400 colors are available.

More information? Circle Item 2, postcard, last page.

Paint Stick

A marking device to facilitate identification of materials on and off the job is offered by Markal Co., Chicago, Ill. Called Markal B, it is an all purpose permanent cold marker for sheet metal, pipe, fittings, duct work, plastics, ceramics, and rubber. Marks are easily made on oily, slick, or wet surfaces and will withstand all types of weather conditions. Also, no amount of handling will deface marks in any way.

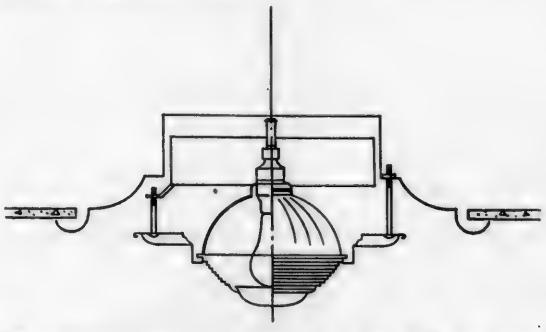
The product is real paint in stick form and, in the case of marking duct work, the marks can be painted over. Stick is available in 13 colors and is especially useful for color coding pipes that carry different types of liquids or gases, air or hot and cold water and steam.

According to the manufacturer, marks made are weatherproof, fade-proof and permanent and are not affected by rust or any type of weather condition. The marks cannot be removed except by choice.

More information? Circle Item 3, postcard, last page.

Diffuser-Lighting Fixture

One ceiling opening serves for both air supply and illumination with a Kno-Draft air diffuser and Holophane lighting fixture combination, offered by Connor Engineering Corp., Danbury, Conn.



The simple two-cone design of the diffuser and its sleeve-type damper provides ample space for the Holophane light without interfering with air volume or direction.

Units are made in 6 to 16-inch neck diameters, accommodating 100 to 500-watt bulbs. Capacities, depending upon type of space and allowable neck velocities, range from about 200 to 1500 cfm.

More information? Circle Item 4, postcard, last page.

Electronic Temperature Alarm

Four-way temperature protection is provided by an electronic alarm, called Hi-Lo & AC Failure temperature alarm, announced by Philadelphia Scientific Glass Co., Quakertown, Pa. With sensitivity of ± 0.3 deg F, it will:

Show a green light if the temperature of the controlled medium is within the proper range; show a red light and sound a buzzer if the temperature is below range; show two red lights and sound a warning buzzer if the temperature is above; and actuate a battery-operated buzzer if the current fails.

Alarm's 3½ by 6 by 8-inch metal box mounts on a wall with one screw support and plugs into 110-volt a-c supply. Its mercury thermostat is inserted into the temperature control unit. Temperature control range may be set at any interval between —30 and +550 deg.

More information? Circle Item 5, postcard, last page.

Combustion Control Packages

A line of ten separate and distinct standardized packaged electric combustion controls is announced by The Hays Corp., Michigan City, Ind.

The package consists of completely piped and wired free-standing panel containing all instrumentation and control necessary for fully automatic operation of single burner gas- and oil-fired boilers, either of the packaged or field-assembled design. Manual-automatic control stations together with indicating lights and push buttons, are located on a small console, 33 inches from the floor, much in the same manner as large central stations have control stations arranged. Both convenience and safer operation are said to be enhanced by this arrangement. The electrical components cabinet is placed immediately beneath the console and contains the automatic programming control, the fan starter, relays and terminal strips — all readily accessible from the panel front. Bulletin 57-1088-239 details the ten systems.

More information? Circle Item 6, postcard, last page.

Moisture-Free Motor Insulation

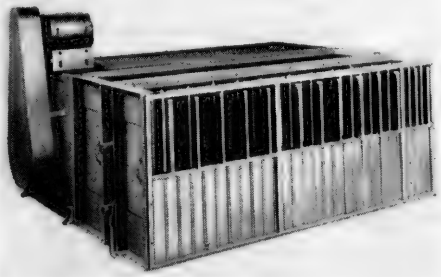
Hermetic motors, with a completely new all-synthetic insulation system that is essentially moisture free, are announced by Hermetic Motor Dept., General Electric Co., Holland, Mich., as available for air conditioning and refrigeration compressor applications.

Average moisture content of the new insulation is 80 to 95% less than with insulating materials now being used. The synthetic system is capable of continuous operation at a 35 deg F higher temperature level than possible with materials now in use, according to company engineers.

More information? Circle Item 7, postcard, last page.

Heating and Ventilating Units

A completely redesigned line of heating and ventilating units is available from American Blower Division of American-Standard, Detroit, Mich. The line provides a broader capacity coverage with 11 sizes for requirements from 600 to 66,000 cfm (300 to 1200 fpm coil face velocity). New sectional construction in the units permits greater arrangement flexibility than ever before possible. Units, coils and accessories can be built up in any sequence required to meet the needs of a specific job.



Three unit types are available. Type L Lineflow fan unit is a quiet, compact air handling unit designed for commercial and industrial use in such applications as filtered air supply, air conditioning zone distribution, and non-corrosive, non-fouling kitchen and laboratory hood exhaust.

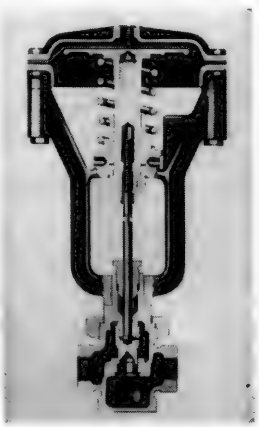
Type V heating and ventilating unit is designed to provide complete coverage of central station heating and ventilating requirements. Heating can be accomplished with either steam or hot water. Typical applications include offices, auditoriums, factory areas, gymnasiums, laboratories, schools, and stores.

Type VB multi-zone unit, illustrated, performs the same functions as the Type V unit, but in addition provides individual zone control of temperature from a single central unit.

More information? Circle Item 8, postcard, last page.

Diaphragm-Operated Control Valves

A complete line of diaphragm-operated valves, designed for instrument-actuated control of temperature, pressure or flow, is announced by the Sinclair-Collins Valve Co., Akron, Ohio.



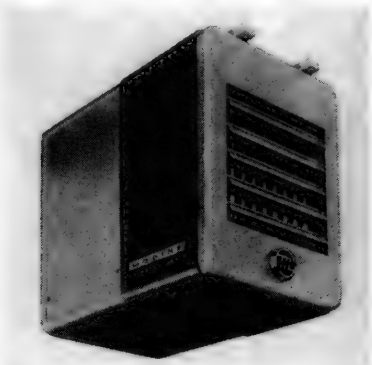
Featuring V-port design and said to afford extremely precise modulation of flow because of tapered variable port area, these valves are offered in both direct and reverse acting types. Intended for steam, air, liquid or gas service up to 250 psi, diaphragm-operated valves are available in sizes ranging from 1/16 through 2-inch NPT (direct acting) and ⅛ through 2-inch NPT (reverse acting). Instrument air supply pressure requirements are from 2½ to 12 psi for the direct acting types; from 4 to 13 psi for reverse acting valves. Spring tension is adjustable.

Cast valve bodies of Navy M bronze, yokes and tops of high-quality valve bronze, corrosion-resistant K-monel stem, and 18-18 stainless spring are said to assure trouble-free service.

More information? Circle Item 9, postcard, last page.

Blower-Type Unit Heater

The latest addition to the Modine Manufacturing Co., Racine, Wis., line of gas-fired equipment is the Series GB blower-type unit heater. Designed for suspended installation in the room to be heated or in an adjacent room, these units may be installed with or without duct work. The gray-green baked enamel finish, with a light touch of chrome in the medallion, effectively accents the styling.



Available in seven sizes, ranging from 50,000 to 310,000 Btu per hr, these units are completely assembled at the factory, and shipped to the job ready for installing.

Blowers and constant speed, belted motors, with adjustable pulleys for varying blower speed, are specifically engineered to operate against static pressure as high as 0.4 inches, important especially in installations requiring long runs of duct work. Dynamically balanced blower wheel, resiliently mounted motor, and blower speeds below 900 rpm insure quiet operation.

Controls, simplified and conveniently grouped within the unit, include solenoid valve, automatic shut-off valve, and a pressure regulator. The manual shut-off valve may be mounted outside the unit for instant accessibility.

More information? Circle Item 10, postcard, last page.

Heat Pumps—2 to 50 Tons

A complete heat-pump line is offered by Typhoon Heat Pump Co., Tampa, Fla., a division of Hupp Corporation. The 1958 models include air-to-air, water-to-air, water-to-water, air-to-water, and water chillers in sizes from 2 to 50 tons.

Water-to-air models constitute a low-cost line with decorator fronts, and a larger range of sizes to 40 tons with multiple compressors. An expanded line of air-to-air units include 3, 5, 7½-hp models in two sections with remote compressor, and other models up to 30 hp.

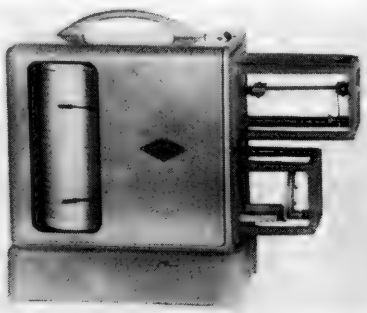
Compactness of the 2 to 50-ton water-to-water line is demonstrated by the 10-ton unit which occupies 28 by 28 inches of floor and stands 44 inches high. Water chillers are offered in the same sizes.

There is an increasing interest in air-to-water models, the company states, which are built to customer specifications.

More information? Circle Item 11, postcard, last page.

Humidity and Temperature Recorder

An indoor-outdoor hygrothermograph providing high-accuracy humidity and temperature indications, both direct reading and recording, is available from Serdex, Inc., Boston, Mass.



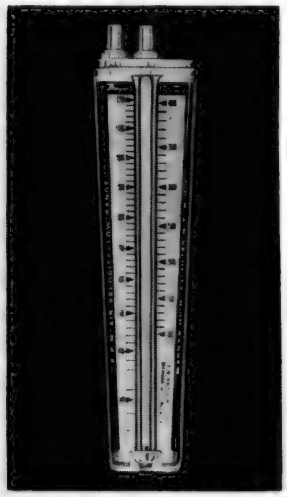
Hygrometer accuracy, carefully calibrated against laboratory standards, is guaranteed repeatable within ± 3% relative humidity. Operating range is 15% to 95% R. H. at temperatures from 32 to 130 deg F. Correction charts are available for low temperature application. The temperature sensitive element of cantilever type bi-metal is guaranteed accurate within ± 1 deg F from 0 to 100 deg.

This hygrothermograph, Model HGS-HYT-1, provides for the first time, the company states, an instrument in which the sensitivity, range, and lag of humidity and temperature sensing units are of the same order of magnitude. Easy to read, 6-inch daily or weekly recording charts are available.

More information? Circle Item 12, postcard, last page.

Air Velocity Meter

A precision air velocity and static pressure indicator is announced by F. W. Dwyer Mfg. Co., Michigan City, Ind. The No. 460 air meter gives direct readings for furnace draft, pressure drop across air filters, duct air velocity, supply grille velocity, as well as return grille velocity.



The instrument is based on the principle of the variable area flowmeter and has only one moving part. Air velocity is registered in two ranges—260 to 1200 fpm on the low side and 1000 to 4000 fpm on the high side. Static pressure is .005 to .09 inches of water, low range and .05 to 1.0, high range. The high range is used simply by capping one of the two connectors at the top of the meter with the index finger.

Air meter is a complete test kit for virtually all air velocity and static pressure measurements. Full accessories are supplied, including molded plastic probes for supply and return grille velocities, angle connector and tubing lead, air velocity calculator slide rule, maintenance kit, and instruction card. The entire kit comes in a pocket-size plastic case.

More information? Circle Item 13, postcard, last page.

Cabinet Heaters—35 Ratings

A redesigned line of cabinet heaters that permits selection of a broad range of hot water and steam ratings is available from American Blower Div., American-Standard, Detroit, Mich.

Units are offered in 7 basic unit sizes with cabinets in 7 colors.

One-row and 2-row heating elements (equally suitable for steam or hot water) and a 3-row hot water element are available for each size. This permits selection of 21 hot water ratings and 14 steam ratings.

The cabinet heater is produced in two types. Four sizes are of the direct-connected, blow-through type, having 2 forward-curved, double-inlet aluminum blower wheels mounted on a double-extended motor shaft. Three sizes are of the draw-through type, available with 3, 4, or 5 forward-curved, double-inlet aluminum blower wheels mounted on a common shaft.

Blow-through designs may be had with three-speed motors where extra-quiet operation is required. Fans in the draw-through units are belt driven by a motor mounted within the unit casing. High-speed drives are available where the unit is required to operate against external resistance. Where lower noise level is essential, low-speed drives can be supplied. Draw-through models are also available with 2-speed motors.

Both types of units are available for floor, ceiling, wall or inverted mounting; non-recessed, semi-recessed, fully recessed or concealed installation. Semi-recessed units can be provided with a projecting, overlapping front to finish out the installation. Fully-recessed models include an overlapping front for covering the rough recess edges. Intake may be face or bottom; discharge may be face or top. Floor-mounted units are also available with a rear intake.

More information? Circle Item 14, postcard, last page.

Brass Relief Valves

Three brass combination temperature-pressure relief valves and one brass pressure relief valve for water heaters and storage tanks are introduced by Crane Co., Chicago, Ill. They are No. 1143 and 1163 brass combination temperature-pressure relief valves of the fusible plug type; No. 1147 thermal element type; and No. 1169 brass pressure relief valve.

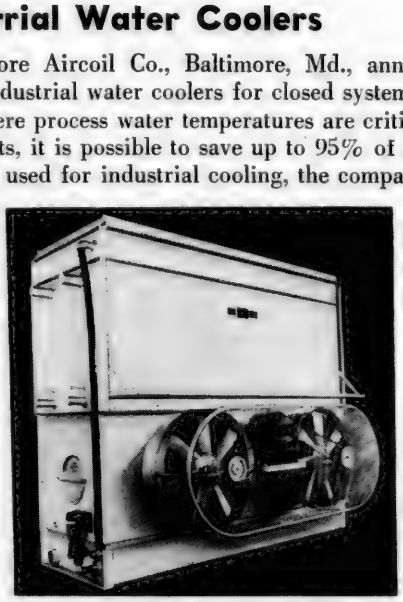
The valves have a brass body, 18-8 stainless steel spring, and a brass disc holder with a molded silicone rubber disc.

The three combination valves have a thermal discharge rating of 175,000 Btu per hr. No. 1143 and 1147 are designed so that no adjustments can be made that will affect the pressure setting in the field. No. 1163 is calibrated and is set and locked at the factory, but is adjustable in the field.

More information? Circle Item 15, postcard, last page.

Industrial Water Coolers

Baltimore Aircoil Co., Baltimore, Md., announces a line of industrial water coolers for closed system applications where process water temperatures are critical. With these units, it is possible to save up to 95% of the water normally used for industrial cooling, the company states.



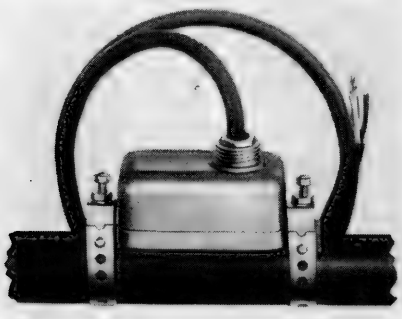
The complete line includes three styles: Centrifugal fan draw-through units, suited for indoor installation where floor space is a factor; centrifugal fan blow-through units, featuring dry fan operation for longer life; and propeller fan blow-through units, for use where minimum horsepower is desired.

Applications of these units include cooling water for diesel or gas engines, air compressors, plastic molds, and other types of water jacketed equipment.

More information? Circle Item 16, postcard, last page.

Summer-Winter Thermostat

Summer-winter changeover thermostat manufactured by Barber-Colman Co., Rockford, Ill., is designed for use on combination heating and cooling air conditioning units. It is said to effectively sense the temperature



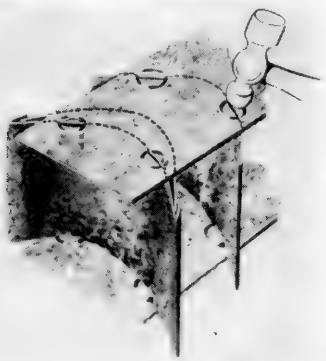
of the supply media and reverse the control action of the room thermostat sensing element to comply with the flow of either hot or chilled water.

Its switch action is single-pole, double-throw, snap-acting. It has a non-adjustable control point setting at 70 deg F and a fixed differential of approximately 15 deg. The thermostat is factory sealed to prevent condensation from forming on its contacts. It may be mounted in any position and comes equipped with mounting strapped for easy installation.

More information? Circle Item 17, postcard, last page.

Turning Vane Rails

A quick and economical method of fabricating turning vanes in square elbows is announced by Cain Manufacturing Co., Birmingham, Ala. Called Instant-Vane-



Rail, the product consists of 24-gage galvanized strip, 4½-inches wide by 100-ft long, coiled in a dispenser-type carton. Rail contains button indentations, slotted to hold vanes, which are simply peened with a hammer, as shown, for a finished rattle-proof unit.

Use of the fabricating product is said by the company to eliminate layout, tab cutting, hole punching, and spot welding. Radius and spacing of vanes (single or double, as illustrated) is fixed by location of button indentations according to best engineering practice.

More information? Circle Item 18, postcard, last page.

Chemical Resistant Coatings

Corrosion Control Company, Inc., New York, N. Y., announces its line of chemical resistant coatings and linings for plant maintenance and protection. Called Corethylene 100 and Corethylene 101, both series are based on synthetic Hypalon rubber and are said to be effective protection against a great many corrosive reagents including strong oxidizers such as concentrated nitric and chromic.

Corethylene 101 is a one-package, room temperature curing spray, brush, or roller coating, applicable to any type of surface and resistant to chemical spills, fumes, and drips with a temperature range from 40 to 275 deg F. Coatings are unaffected by sunlight, weathering, ozone, and cure to tough abrasion-resistant rubber films. It dries fast and has excellent resistance to acids, especially oxidizing ones, and is resistant to all salts and alkalies, the company states.

Corethylene 100 is a two-package, room temperature curing chemical resistant lining designed for immersion service over a wide temperature range. It may be brushed, sprayed, or rolled by regular plant maintenance men and when cured at room temperature is said to be superior to baked linings. It has an effective temperature range from —40 to +250 deg F.

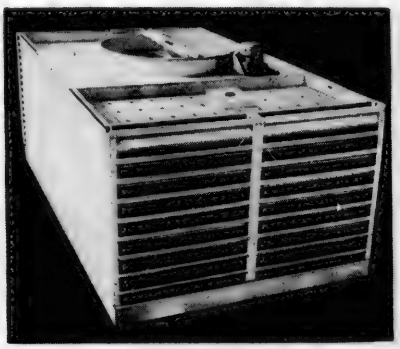
Both paints are packaged in 1-gal cans, 5-gal pails, and 55-gal drums, and available in the following standard colors: black, white, green, yellow, orange, red, blue, and grey.

More information? Circle Item 19, postcard, last page.

Fire-Safe Cooling Tower

A new series joins the J. F. Pritchard and Company of California (Kansas City, Mo.) line of Lo-Line cooling towers with capacities ranging upward from 75 tons.

Companion to the company's redwood framed tower, the Fire-Code tower features all-steel structural members that are hot-dipped galvanized, after fabrication, for



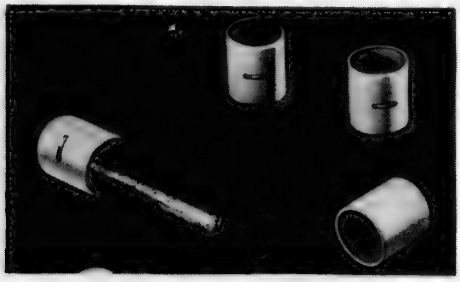
extra corrosion protection. Louvers, casing, distribution system, and fan deck are asbestos cement, adding to the fire-safeness.

Designed specifically for conforming to standard metropolitan fire codes, the tower complements architectural design through its low profile and uniform exterior treatment.

More information? Circle Item 20, postcard, last page.

Thread Protector Caps

Thread protector caps that snap on instantly, yet will not come off unless unscrewed, are available from Precision Paper Tube Co., Chicago, Ill. This feature of operation has been accomplished by means of a metal staple that snaps into and conforms to the thread pattern. Thus, the cap can be depended upon to hold firmly regardless



of vibration and jarring during shipment, handling, installation, or actual plant use, as well as during storage.

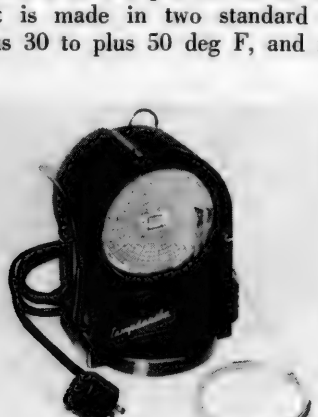
Made from plastic-coated kraft paper, the caps are extremely low cost. The kraft paper affords ample strength for practically all applications and provides a snug fit to keep out dust and dirt. The plastic coating insures protection against moisture, grease, chemicals or other conditions that might cause corrosion or rust.

Known as Tecto-Caps, the protectors are furnished in standard diameters to fit all pipe and rod sizes up to one inch. They can be supplied in closed or open-end types, and are available for immediate shipment in any production quantity.

More information? Circle Item 21, postcard, last page.

Temperature-Operation Recorder

Bacharach Industrial Instrument Co., Pittsburgh, Pa., announces that its line of Tempscribe recorders has been expanded to include a combination temperature-operation recorder. This two-pen instrument incorporates all the features of the bulb-type, single-pen temperature recorder, and has a second pen for recording electrical operation. It is made in two standard temperature ranges: Minus 30 to plus 50 deg F, and minus 30 to plus 120 deg.



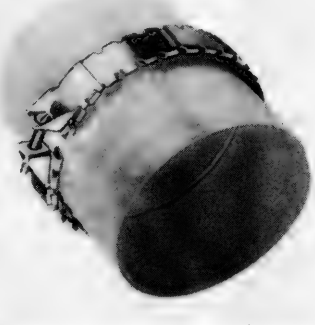
The advantage claimed for this two-pen recorder is that it shows on the same chart the exact temperature at all times during the test period as well as the running time and length of on-and-off periods of electrical equipment. For this reason the instrument is said by company to be suitable for testing, refrigerators, frozen food compartments, air conditioning and heating installations, and other applications where a synchronized record of temperature and electrical operation is useful.

The instrument is equipped with a 6-ft electrical cord for operation, and a temperature sensitive bulb at the end of 6 ft of flexible capillary tubing for remote temperature readings.

More information? Circle Item 22, postcard, last page.

Flexible Couplings for Ducts

Marman Ventiduct flexible coupling is a means of making strong, fast joints in ventilating, heating and air conditioning systems, and other commercial ducting. According to the manufacturer, Marman Div., Aeroquip Corp., Los Angeles, Calif., the system outmodes exbolted flanges and welded, riveted or metal screw fastening methods for joining sheet metal ducts.



Features of the coupling include greater ease of field assembly and installation of duct systems, particularly in cramped work spaces, greater simplicity of dismantling and reassembly of ducting for periodic inspection or cleaning, low initial cost, and long trouble-free service life.

Only one nut and bolt is required to close the coupling, thus enabling a simple, rapid installation in partitions or in close clearance work. The coupling is most effective in vibration conditions which would normally loosen or crack conventional ducting joints.

More information? Circle Item 23, postcard, last page.

Air Conditioning Deodorant

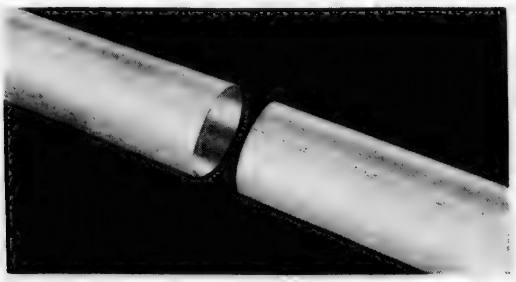
An air conditioning deodorant, called Eastonair, is available from Industrial Div., Easton R.S. Corp., Brooklyn, N. Y. A solid chemical odor-absorbing agent, the material not only removes odors and fumes from heated or air conditioned spaces but also imparts no odor of its own to the spaces.

The company, on the principle that an air conditioning deodorant should be handled as other parts and supplies for the heating and air conditioning industry, issues a warranty of the effectiveness of the product.

More information? Circle Item 24, postcard, last page.

Telescopic Connector

A telescopic connector is developed by Duc-Pac, Inc., East Longmeadow, Mass., which eliminates cutting and notching during the installation of stack ducts. Named



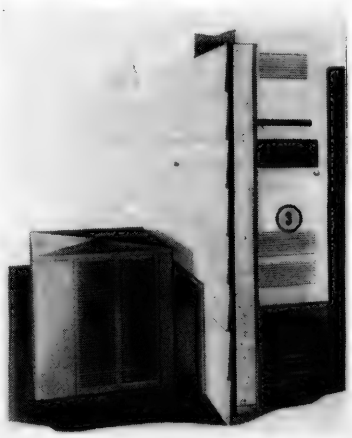
Adjusta-Duct, connector merely slides in or out to the length necessary for any "fill-in" section.

Internal and external lip-seal flanges provide a wiping action which assures tighter connections than were possible with old-fashioned cut-notch-join methods. Connectors are available in several adjustable lengths.

More information? Circle Item 25, postcard, last page.

Central Through-Wall Unit

An insert-type central home air conditioner, a prototype of which was tested in an experimental house designed by the research institute of National Association of Home Builders, Kensington, Md., is offered by Frigidaire Div., General Motors Corp., Dayton, Ohio. It installs through the wall of a house almost as easily and inexpensively as a room unit, the company states. Production is scheduled for this month.



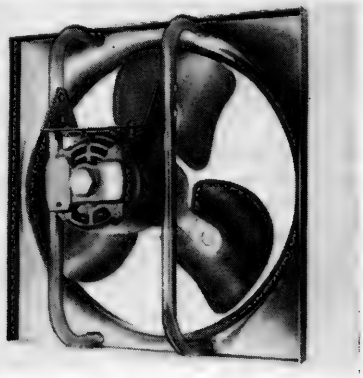
A 2-ton capacity air-cooled condensing unit and cooling coils make up the factory-assembled package. Condensing unit, circle 1 in photo, remains outside the house as cooling coils, circle 2, slide through the wall into furnace plenum. Furnace, circle 3, is mounted on plenum.

The cooling package is adaptable for use with any type warm air furnace in houses with or without basements. Insert units with 2- and 3-ton cooling capacities will be produced later. Because the cooling coils are a part of the condensing unit package that slides through the wall into the furnace, refrigerant tube connections are made by the manufacturer, so that the entire unit comes from the factory sealed and tested. The cooling system may be installed later if the homeowner decides to have just the heating system at the start.

More information? Circle Item 26, postcard, last page.

Light-Weight Ventilators

Production and distribution of a direct-drive general ventilating fan, the Chelsea BA, is announced by Chelsea Fan & Blower Co., Plainfield, N. J. Light in weight, but highly efficient, fan is particularly suitable for industrial



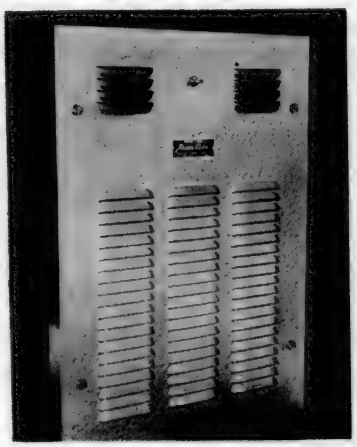
ventilating applications, the company states. Fans feature a true Venturi orifice, rugged square mounting panel, sleeve bearing semi-enclosed motors, and high capacity PFMA certified ratings.

Also introduced by the company is a new type BG utility exhaust fan which includes two-speed controls and convenient outlet box. It also has PFMA certified air ratings.

More information? Circle Item 27, postcard, last page.

Wall-Mounted Air Purifier

A compact, self-contained air purification unit designed for flush-mounted installation in a wall is added to the line of activated charcoal products manufactured by Barnebey - Cheney Co., Columbus, Ohio.



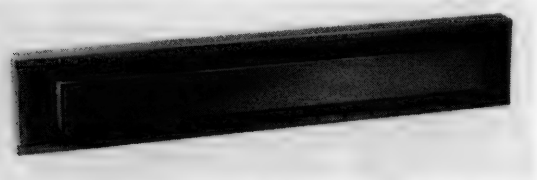
Originally intended for use in kitchens, recreation rooms, and lavatories, the wall unit is said to be versatile and useful in any area where odor and air contamination exist. The purifier performs three important air conditioning functions. It refreshens and deodorizes the air. It removes air-borne dust. It circulates the air.

The wall purifier consists essentially of a series arrangement of dust filter, activated charcoal adsorber cell, and an exhaust fan, all compactly housed in a cabinet provided with an attractively finished louvered cover plate. Once installed, the unit is operated by pushing the *stop* and *start* button that controls the fan motor.

More information? Circle Item 28, postcard, last page.

Electric Baseboard Heaters

Addition of Dual-Fin electric baseboard heaters to its line is announced by Electrovector, Inc., Brooklyn, N. Y.



Easy to install, the heaters have no fixed top and can be reversed without disassembly.

Available with a wall-mounted or built-in thermostat, baseboard heaters come in capacities of 750, 1500, and 2000 watts, and in lengths of 3, 6, and 8 ft. Heating element is aluminized steel.

More information? Circle Item 29, postcard, last page.

Package Boilers Improved

Four boilers rated at 20, 30, 40 and 50 hp add wet-back design to the other advantages of the Pakette line of packaged automatic boilers manufactured by York-Shipley, Inc., York, Pa. Boilers may be ordered to supply high-pressure steam (125 psi), low-pressure steam (15 psi) or hot water (30 psi). The boilers may be fired with light or heavy fuel oil, natural or mixed gas, or both oil and gas.

The boiler's wet back, a circular water chamber at the rear head, carries off excess heat, permitting operation at a higher rating for the physical size. Any of the four models can be installed in a floor space of 4 by

7 by 6 ft high. Every one of the four has less than 100 sq ft of heating surface and slightly less than 3 sq ft of equivalent grate area, thereby permitting operation in New York City and in Massachusetts without a licensed operator in attendance.

The water-cooled rear head is a pressure vessel attached to the boiler with equalizing line. It can be swung out of position easily. The head is mounted on a swinging davit and held in place by a single latch. Since all piping to the head is through swivel joints, the head may be opened for inspection and cleaning of the boiler without disconnecting any of the pipes.

A large portion of the refractory in the rear of the boiler has been eliminated because of the wet-back design. Furthermore the arch that separates the boiler passes has been completely water-backed, thus eliminating additional refractory. The need for maintenance is correspondingly reduced by these design changes.

More information? Circle Item 30, postcard, last page.

Conditioner-Convector System

A combination air conditioner and convector-heating system is introduced jointly by Kelvinator Div., American Motors Corp., Detroit, Mich., who manufactures the air conditioner, and Embassy Steel Products, Inc., Brooklyn, N. Y. Components of the Weather-Twins are housed in an integral cabinet.

The advantages of this type of system are said to be that the self-contained air conditioner is installed in individual rooms at any time convenient to the owner. Sleeves and cabinets are installed at the time of building construction.

The convector is adaptable for one-pipe steam systems, two-pipe vacuum systems, and hot water systems. It has no fans, so is completely silent, and is available also for rooms where air conditioning will not be required, as are the air conditioners available for rooms in which heating will not be required.

Cabinet and sleeve fit through and under the window wall, flush with the face of the building, and almost flush inside.

More information? Circle Item 31, postcard, last page.

Sealed Miniature Thermostat

A miniature Thermoswitch unit is developed by Fenwal Inc., Ashland, Mass., to satisfy requirements for small, lightweight, and rugged thermostats which will give precise temperature control. The unit is hermetically sealed; yet temperature settings can be made in the field or at the factory.

Overall size of the thermostat is 1.25 inches long, 0.562 inches high, and 0.401 inches deep, and it has an inherent sensitivity of less than 1 deg F. Differential expansion of metals is the operating principle of the unit. Temperature changes expand or contract the stainless steel outer shell which actuates the inner assembly to make or break the totally enclosed contacts. Electrical terminals are isolated from ground.

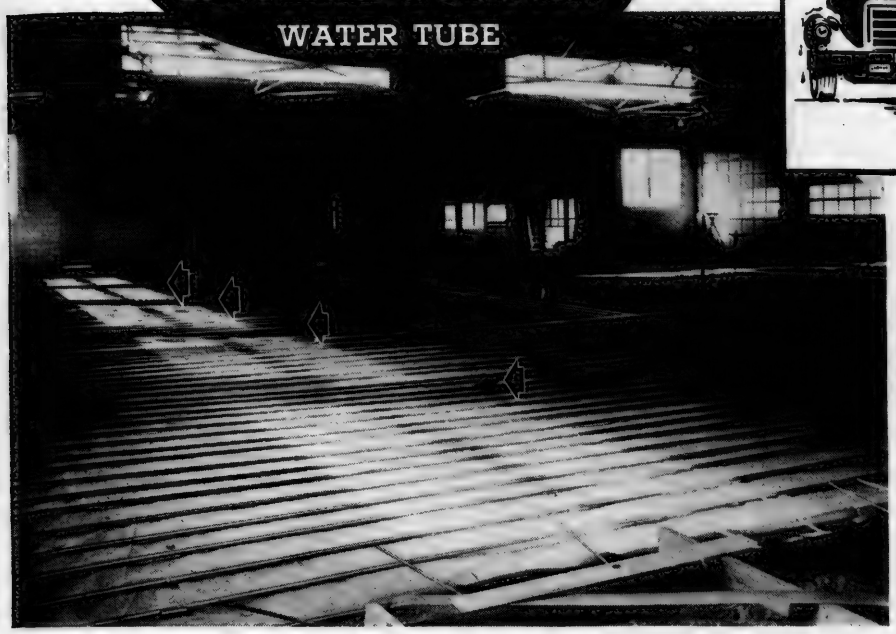
More information? Circle Item 32, postcard, last page.

(Continued on page 110)

what they're doing with

REVERE COPPER

WATER TUBE



THE 10,000 FT. of ¾" Type "K" Revere Copper Water Tube used on this job was furnished by the Revere Distributor: FLANAGAN SUPPLY COMPANY, Oklahoma City. 20' straight lengths of hard copper were specified for the grid type installation. Note drains for carrying away melted ice and snow so floors can be kept clean and dry.

RADIANT PANEL HEATING SYSTEM DOES DOUBLE DUTY IN TRUCK DEPOT OF RISS & COMPANY, INC.

Oklahoma City

In planning their new depot Riss & Company, Inc., told the architect and builder they wanted a heating system that would de-ice the road equipment entering the shops for repairs and at the same time keep the concrete floor sufficiently warm and dry so that the mechanics, who spend 60% of their time on or near the floor, would be comfortable.

There seemed to be only one practical answer: Radiant panel heating. And as to the kind of material used for the panels: Revere Copper Water Tube. Here's why: Uniformity and proved quality of Revere Copper Water Tube. Easy-to-make solder fittings. The surety of tightness when solder fittings are used. The enduring and non-rusting qualities of Revere Copper Water Tube. And, as contractors tell us again and again, "Contrary to what has been said about the cost of copper, it has been our experience that, all things considered, copper costs less to install than rustable material." And they show us figures to prove it.

These same features, which are inherent in various types of Revere Copper Water Tube also make it the preference of contractors, architects and engineers for hot and cold water lines, underground service lines, air conditioning and processing lines. See the Revere Distributor nearest you for your needs.

NO NEED TO WORRY about catching cold on this floor. It's heated by radiant panels. Architect: HARRY L. WAGNER, Kansas City, Mo. Builder: SHAMROCK ENGINEERING & CONSTRUCTION COMPANY, Oklahoma City. Engineer: COLLINS & GOULD, Oklahoma City.

REVERE COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

COPPER ★ BRASS ★ REVERE ★ ALUMINUM

(Continued from page 108)

Automatic Chlorinating Unit

An accurate, automatic chlorinating unit operated solely by water power instead of electricity, and designed for use in home, farm, and commercial water well systems, is announced by Clayton Mark & Co., Evanston, Ill. With the Chlorinjector, a well owner can inexpensively duplicate water purification services usually available only in metropolitan areas, according to the company.

Unit is engineered to inject a tiny stream of ordinary household chlorine bleach into the water supply in the exact amount and proportion needed to safeguard health.

The device, designed like a home water meter to be compact and installed directly in the water line, can treat up to 43,200 gal of water daily. It also can utilize polyphosphate crystals to prevent mineral stains, lime scale, and corrosion. When installed on a by-pass line, it can treat up to 100,000 gal of water a day to chlorinate swimming pools and small community water supplies.

A finger-tip control knob adjusts the unit's rate of feed. It is used initially to set the strength of the chlorine solution in the tap water within the ratio range of three-tenths to six-tenths parts of chlorine to one million parts of water, prescribed by most state health departments as adequate chlorine residual for positive health protection.

More information? Circle Item 33, postcard, last page.

Glass Fiber Insulation Line

Addition of glass fiber insulation for heating and air conditioning applications to its product line is announced by Ehret Magnesia Mfg. Co., Valley Forge, Pa.

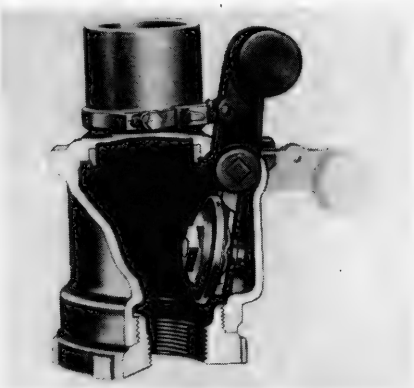
The new insulation, to be known as Therma-K, will be produced in three forms: (1) pipe cover, for insulating hot and cold water piping, low pressure steam lines, and refrigerant lines; (2) duct liner, for insulating and reducing noise in dual heating and air conditioning ducts; and (3) exterior duct and equipment insulation, for covering outside of metal ducts and other heating or cooling equipment.

Designed for applications where temperatures range from sub-zero to 350 deg F, these glass fiber insulations are said to provide low thermal loss, exceptionally light weight, and long life.

More information? Circle Item 34, postcard, last page.

Safety Shut-Off Valve

No. 10 safety shut-off valve, product of Jordan Industrial Sales Div., OPW Corp., Cincinnati, Ohio, shuts off



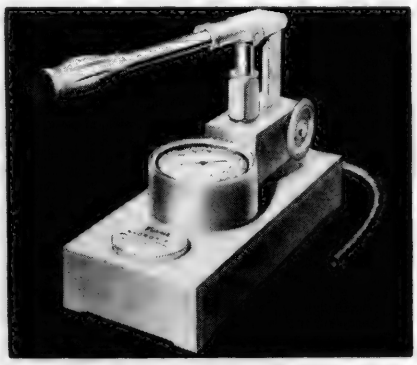
flow of volatile liquids to prevent or starve a fire. It closes automatically in case of fire or accidental bumping.

For such industrial applications as paint, solvent, and chemical lines, the valve is made of cast iron, with Buna-N disc for tight shut-off, in 1-, 1¼-, and 2-inch sizes, with a variety of types of connections.

More information? Circle Item 35, postcard, last page.

Hydrostatic Tester

A lightweight instrument for hydrostatic testing of valves and other pressure equipment is added to the line of instruments offered by Farris Engineering Corp., Palisades Park, N. J. Called the HydroKit, the unit weighs 17 lb and can be taken anywhere, fastening it to a bench or using it as a portable tester.



Consisting of a 3,000-psi hand-operated pump, pressure gage, and easy-to-fill reservoir base, the kit is simple to operate, requiring no previous training. The unit also includes a pressure connection for permanent piping, but is primarily designed for use without an external power source. A 0-500 psi pressure gage is standard, but other gages with ranges from 0 to 3,000 psi are available on request. Other accessories include hydraulic flexible tubing and a steel carrying case.

The unit accurately tests process piping, pressure vessels, boiler tubes, heat exchanger shells, test chambers, and pump casings.

More information? Circle Item 36, postcard, last page.

NEW ENGINEERING MANUAL

A practical comprehensive guide to the design of all-air high velocity systems

56 pages of usable data

The contents of this new engineering manual bring to you 75 years of practical experience in the design, development and application of THERMOTANK-AGITAIR products employed in the control and distribution of conditioned air.

Your Air Devices Inc. representative will gladly assist you in selecting the proper equipment to meet your requirements in designing an all-air high velocity system.

THERMOTANK — AGITAIR

high velocity units • punkah louvers
air diffusers • filters • exhausters

Sold exclusively by representatives for:

AIR DEVICES INC.
185 MADISON AVENUE, NEW YORK 16, N. Y.

AIR DEVICES INC.
185 MADISON AVE.
NEW YORK 16, N. Y.

Please send copy of your new 56-page engineering manual on THERMOTANK-AGITAIR all-air High Velocity Systems.

NAME_____

FIRM_____

STREET_____

CITY_____ ZONE____ STATE_____

☐ ENGINEER ☐ ARCHITECT

Polyethylene Pump

Vanton Pump & Equipment Corp., Hillside, N. J., announces that Marlex 50 polyethylene pump has been added to its plastic sealless pump line and is available in capacities from ⅓ to 40 gpm.

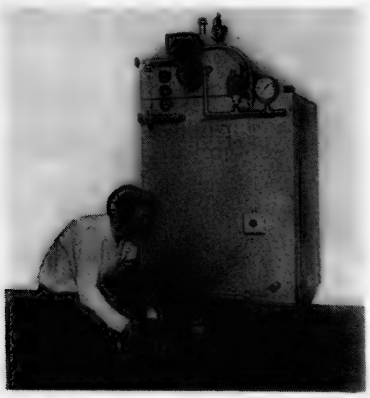
The higher-density polyethylene construction makes it possible to handle extremely corrosive fluids at temperatures up to 260 deg F. Conventional polyethylene is limited to 140 deg service preventing its use under conditions of elevated temperature operation or services requiring sterilization or boiling.

In addition to the increased temperature range, the material is said to possess high tensile strength, low permeability, excellent impact strength, and a high degree of crystallinity. These characteristics expand the application of the pumps to a broader range of corrosive fluids, abrasives, slurries and other solutions which must remain uncontaminated though at high temperatures.

More information? Circle Item 37, postcard, last page.

Automatic Quick-Heat Boiler

An automatic heating and steam boiler so compactly designed it requires less than a third of the floor space of conventional boilers of equal power is announced by Hercules Power Equipment Co., Los Angeles, Calif.



Designated Thermodyne, the company terms the quick-heat unit the most powerful and economical boiler for its size ever built. Test units already in service have reduced fuel operating costs by a third and maintenance costs by 50%.

The boiler has five assemblies: Steam drum, tube section, frame, and inner and outer panels. Designed on a modified U-principle, the unit's vertical water tubes expand into a large capacity steel drum and cast steel headers. Available are 14 variations of three basic units, ranging from 5 to 1000 hp. Boilers, with interchangeable burner, burn gas or oil, and can also be built for electricity.

More information? Circle Item 38, postcard, last page.

T-P Relief Valve

An automatic reseating temperature and pressure relief valve, built to meet state codes requiring that a relief valve be automatic reseating on temperature relief as well as on pressure relief, is announced by H. A. Thrush & Co., Peru, Ind.

Available in male and female inlet, listed with AGA, and ASME rated, its special composition high temperature seat and diaphragm is said to assure long service. The valve is also equipped with a testing lever and a permanently attached name plate showing model number and other information.

Valve is for use on all types of domestic water heaters and hot water storage tanks. The temperature actuating element is located at the lower end of a 6-inch stem, which places the element in the top of the tank where the water is hottest. Body and all parts in contact with the water are of brass or bronze.

Model 170M has ¾-inch male inlet and female outlet. Model 170F has ¾-inch female inlet and male outlet. Both are AGA-listed for 550,000 Btu maximum output. ASME ratings at 75, 100, and 125 lb are 450-, 575-, and 700,000 Btu per hr.

More information? Circle Item 39, postcard, last page.

Electrostatic Air Filter

Several innovations in fabric and construction contribute to effectiveness of an electrostatic air filter made by Permatron Corp., Chicago, Ill.

The woven fabric is a high-density plastic with inherent electrostatic characteristics, the maker states. The Permatron filter is said to have more holding power for dust, dirt and pollen due to a supercharging process that increases the electrostatic effectiveness. Thus, more of the foreign elements are drawn out of the air stream without resort to blocking or viscous adhesion.

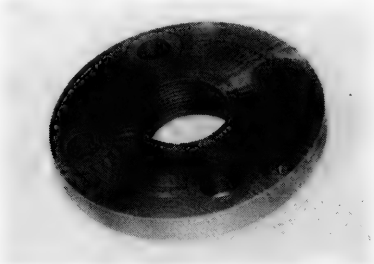
In models one-inch thick or larger, two or more individual ¼-inch metal-framed filters are mounted in a steel frame, separated so as to provide what the manufacturer calls an accumulator chamber. Here, amid the cross currents of air, dust particles which escaped the attraction of the first filter, and have had their electrostatic charge increased in passage, tend to attach themselves to other particles by agglomeration, it is explained.

Air from the accumulator chamber with whatever dust remains, rushes through the second filter where the screening and electrostatic filtering action of the first filter are repeated.

More information? Circle Item 40, postcard, last page.

Serrated-Face PVC Flanges

Tube Turns Plastics Inc., Louisville, Ky., announces replacement of its existing line of smooth-face flanges with a complete line of flanges with concentric-serrated faces for polyvinyl chloride piping systems.



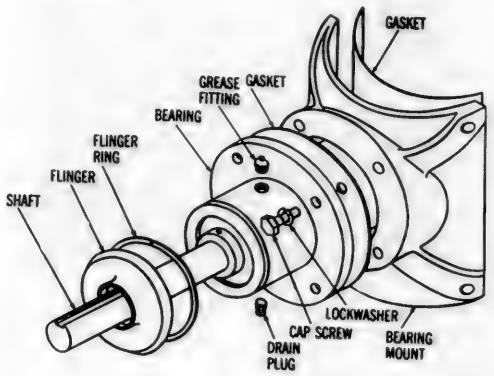
Company cites better gasket retention, a more effective seal, and improved appearance for its switchover from smooth-face to serrated-face flanges. Adopting concentric serrations instead of the phonograph-record type of spiral serrations eliminates the chance of a fluid traveling around the spiral grooves between serrations until it eventually leaks from the flange. With concentric serrations the fluid is sealed off at the first serration.

The new flanges, having approximately 32 serrations per inch, will be produced in sizes from ½ through 6 inches in both socket and threaded types and in both normal and high impact material.

More information? Circle Item 41, postcard, last page.

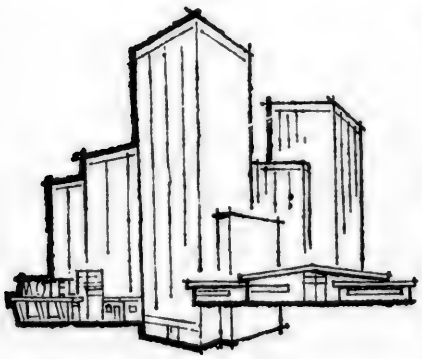
Unique Bearing Assembly

A new bearing assembly is announced for its BT tube axial fan, a belt-driven unit, by its manufacturer, Power Line Fan Co., Plainfield, N. J. The bearing is protected by flinger and shield, in addition to Neoprene seals on the bearing itself.



Bearing is thus protected from contaminated atmospheres, the entire space within the bearing house serving as a grease reservoir, and the bearing itself easily lubricated from the outside of the unit. If repairs become necessary, the entire shaft, bearing, and pulley assembly may be removed by taking out a few bolts.

More information? Circle Item 42, postcard, last page.



In the new, automatic world you're making . . .

Your ideas work better when you work with HONEYWELL

More products to give your ideas greater scope. From Honeywell you get a great variety of products both mechanical and electrical. Honeywell is the only company that makes a complete line of pneumatic, electric and electronic controls plus instrumentation for commercial buildings. With Honeywell your choice is wider, your ingenuity less restricted.

More ideas that go with yours. Honeywell has pioneered the concept of central-systems control for commercial buildings, now the accepted trend. This and other Honeywell ideas have increased recognition of the importance of operational equipment, and helped to make your contribution bigger, better and more important.

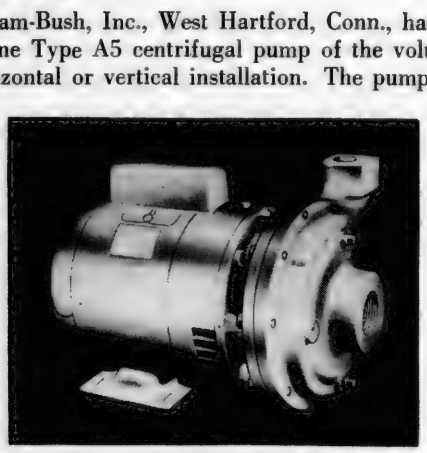
More support. Honeywell works with you on every job, frees you from annoying details, saves you time, even helps you sell. And the assistance of Honeywell specialists in each of 112 offices throughout the country is as near as your phone.

Look over the Honeywell products and ideas on the following pages. And, remember, each is backed by the kind of support that only Honeywell can offer you.

FOR MORE TO WORK WITH ... WORK WITH HONEYWELL

Centrifugal Circulator

Dunham-Bush, Inc., West Hartford, Conn., has added to its line Type A5 centrifugal pump of the volute type for horizontal or vertical installation. The pump can be



used as a circulator in a hot-water system, chilled water air conditioning system, or in a cooling tower installation.

Mechanical construction of the motor includes ball-bearing drip-proof frame with conduit box for easy connection. Shaft and mounting flange comply with NEMA standards, permitting interchangeability.

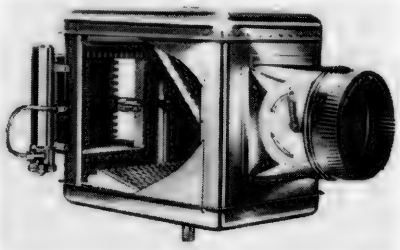
Thirteen sizes are available ranging from 1/3 to 2 hp in capacities to 150 gpm.

More information? Circle Item 43, postcard, last page.

Automatic Spray Humidifier

An automatic spray humidifier that fits all forced air heating systems is available from Lennox Industries Inc., Marshalltown, Iowa.

The Humidispray will evaporate up to 18 gal per day, and automatically meter the proper amount of humidity according to the severity of the weather. This is accomplished (from left to right in photo) by conducting a



flow of warm air from the furnace through a fine spray of water which impinges on a filter pad. The moisturized air returns to the furnace for mixing with the other warm air, and then through the distribution system to the various rooms. The more heat the furnace is required to produce, the more moisture is evaporated. Also, a manual control regulates the flow of air through the spray so that the right humidity is maintained.

More information? Circle Item 44, postcard, last page.

FOR MORE TO WORK WITH ... WORK WITH HONEYWELL

For your mechanical systems...Honeywell Hi Velocity Double-Duct Mixing Box Controls

Now your choice of two constant volume systems

1. Honeywell's new Volumatic* system gives clients dependable, economical, constant volume control of double-duct systems. This control system uses a new type of piston motor with nylon bearings which requires less lubrication. This new Volumatic control system can be applied to all sizes and types of mixing boxes. The sensitive pressure regulator uses a fixed restrictor, error-proof, easier to install and maintain.

2. Honeywell's Duablend* system gives your clients peak performance and minimum maintenance. The Duablend system features *two* pressure regulators to assure constant volume from *each* duct (under control of space thermostat) regardless of pressure changes. Its exclusive Sub-master pressure regulator provides a similar stabilizing control action to the Sub-master duct thermostat in heating and ventilating units.

The Duablend system uses the simple Honeywell Air-Balance Valves*. These valves have no mechanical parts to wear and no adjustments. The valves operate on the balance of air pressure on two sides of a flexible diaphragm.

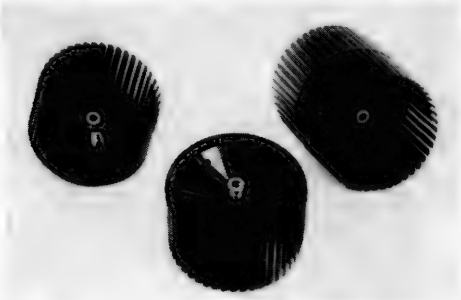
*Trademark

Honeywell

First in Controls

Plastic Blower Wheels

Molded plastic blower wheels, manufactured by Denbo Engineering and Sales Company, Inc., Indianapolis, Ind., are now available in four different diameters, 5⅜, 6⅜, 7⅜, and 8 inches, either as single inlet or double inlet types. They are aerodynamically designed and have a



consistent close balance tolerance. All dimensions are stable and can not be distorted or altered during shipping or assembly on a production line.

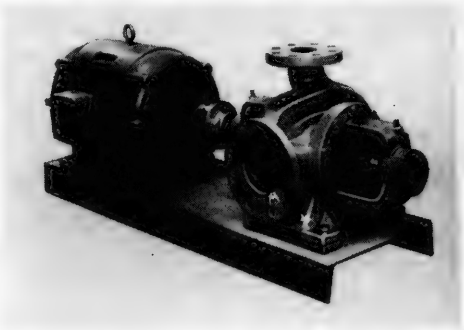
Desco blower wheels can withstand elevated temperatures; they are quiet in operation, corrosion proof, and lighter in weight than steel blower wheels. Blade lengths can be supplied from the maximum length downward to custom fit any application. Hubs can be located either inside or outside the wheel.

More information? Circle Item 45, postcard, last page.

Boiler Feed Pump

Extra long service life is claimed for turbine type, 1750 rpm, two-stage, center-mounted, boiler feed pumps made by Fred H. Schaub Engineering Co., Chicago, Ill.

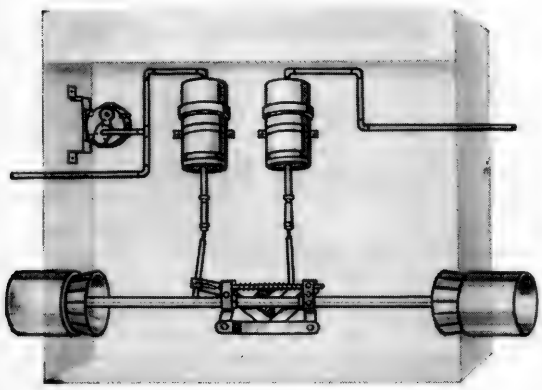
Features include DuraHard electrolized impellers with surface hardness of 1100 Brinnell to resist erosion; double

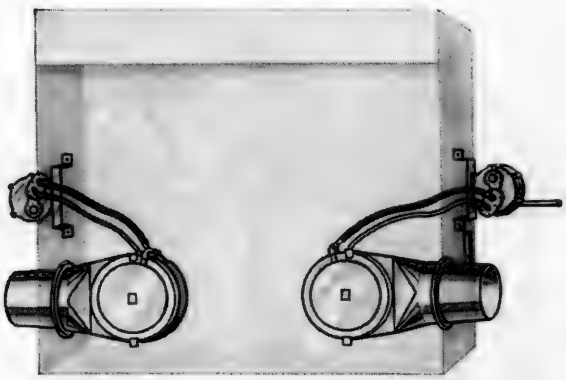


row permanently lubricated ball bearings; balanced radial shaft loading; and over-strength case. Design also permits pulling shaft seals from end of shaft through bearing aperture without dismantling pump.

Pump capacities are to 150 gpm; pressures to 300 psig. Bulletin 65 gives complete description, dimensions, and performance data including "unfavorable" 7-ft and 3-ft NPSH operating conditions.

More information? Circle Item 46, postcard, last page.





Here's how these two dependable systems work

Volumatic System: 1) Space thermostat operates motor to change ratio of hot and cold air. 2) Pressure regulator in mixed air operates another motor to adjust linkage, increase or decrease total volume from hot and cold ducts. Or, 1) Space thermostat operates motor to control hot duct valve. 2) Pressure regulator in mixed air operates motor to control cold duct valve, maintain constant total volume. This low cost system provides dependable control, is easy to maintain and fits all sizes and types of mixing boxes.

Duablend System: 1) Space thermostat resets Sub-master pressure regulator controlling valve in hot duct. 2) Pressure regulator in mixed air controls the total air volume by operating cold duct valve. 3) Change in flow resulting from changes in hot duct pressure is corrected by Sub-master regulator operating hot valve without disturbing cold. 4) A change in flow caused by changes in cold duct pressure is corrected by regulator increasing total flow operating cold duct valve. Sub-master flow regulator holds hot duct flow constant.

Inside-Fin Heat Exchanger Tube

An impervious graphite tube with internal low fins that more than double the inner surface area of Karbate impervious graphite shell and tube heat exchangers has been developed by National Carbon Co., Division of Union Carbide Corp., New York, N. Y. Twenty-three fins, each 3/16-inch high, increase the inner surface to 2.6 times that of a plain 7/8-inch ID tube. The fins twist helically through the length of the tube, providing turbulent flow at right angles to their longitudinal axis, thus accentuating the difference between streamline and turbulent flow, and increasing the heat transfer coefficient as fluid velocities increase.

The increased internal surface area of the new tube makes possible the design of heat exchangers with up to one-half the number of plain ID tubes in those corrosive services where the internal heat transfer coefficient is low and limiting.

More information? Circle Item 47, postcard, last page.

Powder-Actuated Studgun

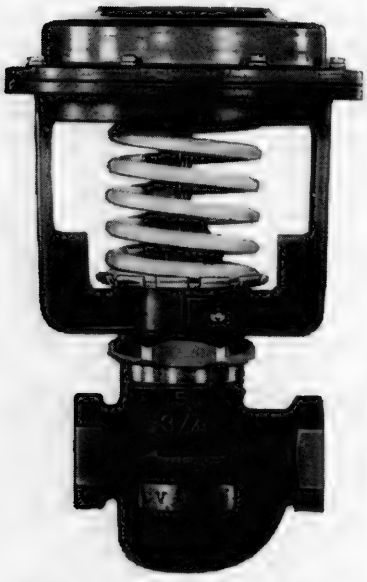
A powder-actuated studgun that will handle all types of fastening requirements and drive all sizes of pins, including 5/16 inches, has been developed by Ammo Products, Inc., Washington, D. C. Called the Ammo studgun, the new tool combines all the functions of light, medium, and heavy duty models into one compact unit for maximum efficiency and economy in fastening to steel and concrete.

By using three quickly interchangeable barrels the studgun eliminates the need for separate tools for various sizes of pins. The operator is able to select the most economical cartridge-pin combination for each job.

More information? Circle Item 48, postcard, last page.

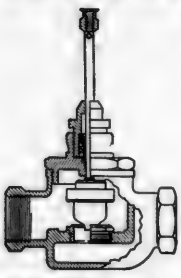
For your mechanical systems . . .
New Honeywell Pneumatic Valve and Motor

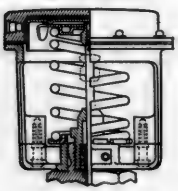
FOR MORE TO WORK WITH ... WORK WITH HONEYWELL



Single seated or three-way valves available in a complete range of sizes. For more information, call your local Honeywell office.

New materials... new designs increase performance for control of steam or water





Valve features! Equal percentage throttling plug plus longer stroke gives better control of steam or water flow at light load.

Exclusive Teflon cone packing lowers friction, lasts longer, requires less lubrication. Easier to change because it comes out with packing nut.

Spring loaded stem and disc holder connection eliminates noise and wear, lasts longer.

Plug type throttling guide eliminates "pocking" of discs due to impingement of fluid through old V Port types.

Packing nut design eliminates periodic tightening, impossible to over- or under-tighten.

Actuator features! Diaphragm design gives more power for smaller diameter. Saves space, positions valve better, gives high close-off ratings. Larger diameter spring eliminates buckling, doesn't rub stem.

Tough Neoprene diaphragm gives longer wear, in normal temperature use. (Silicon available for extremely high temperatures.)

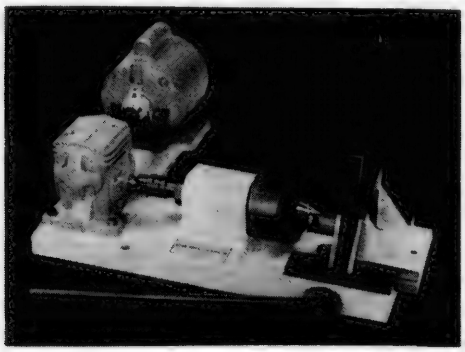
Quick stem-release slide makes actuator easy to remove from valve to change size or to service.

Normally open and normally closed actuators easily interchangeable. Sizes interchangeable, too.

All parts—corrosion resistant.

Power Flaring Machine

Now being manufactured by Olsen Manufacturing Co., Clawson, Mich., for industrial users as well as for custom work is Power Flare, a power-operated flaring machine. Unit flares tube ends so smoothly that pressures



up to 11,000 psi are being utilized.

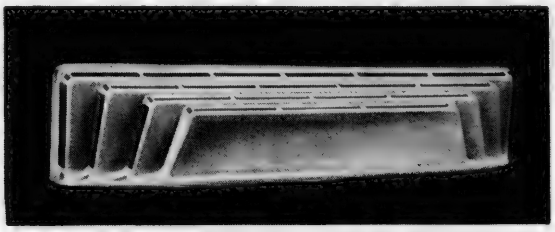
Machine can be used for ¼ through 2½-inch dia steel and copper tubing. A smooth, uniform surface is obtained for seating, and the metal is never work-hardened near the danger point.

Units are furnished with gear reducer and standard motor, or with compact ratio motor. They can be operated from any outlet without special wiring.

More information? Circle Item 49, postcard, last page.

Year-Round Diffuser

A perimeter diffuser adjustable for heating or cooling, is announced by Titus Mfg. Corp., Waterloo, Iowa. The Model P-125 diffuser requires only finger-tip adjustment to change the air flow from a heating pattern to a cooling

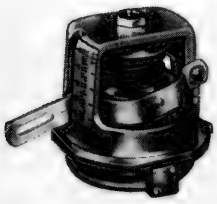


pattern, and vice versa. According to the company it is the industry's first perimeter diffuser capable of supplying separate heating and cooling patterns and thus able to provide the proper throw and spread for obtaining maximum diffusion efficiency for both heating and cooling.

Capacity of the diffuser is such that when set on *cooling*, it will force cool air to highest ceiling levels. When set on *heating*, warm air is gently diffused in a broad pattern over the entire side wall. A built-in damper adjusts from full open to full closed within the diffuser. Fingertip volume control is provided from the side of diffuser. Balancing stops are also furnished.

More information? Circle Item 50, postcard, last page.

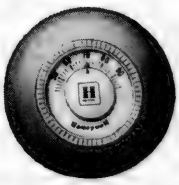
For your mechanical systems...Honeywell's Unit Ventilator Team



M0516 Damper Motor. Rolling diaphragm reduces friction, gives more precise position, prevents sticking.

V0512A Valve. Low friction Teflon cone packing aids rolling diaphragm's smooth action, gives improved modulation.

L0907A Air Stream Thermostat works with room thermostat to reset air temperature delivered by ventilator.



T0901A Pneumatic Round, most accurate schoolroom thermostat available. Low mass bimetal for fast response.

Eliminates hot and cold blasts, gives better unit ventilator performance

This Honeywell control team of air stream thermostat, valve, damper motor and room thermostat exclusively developed for unit ventilators, levels the peaks and valleys of heat and cold so troublesome in high occupancy areas such as schoolrooms.

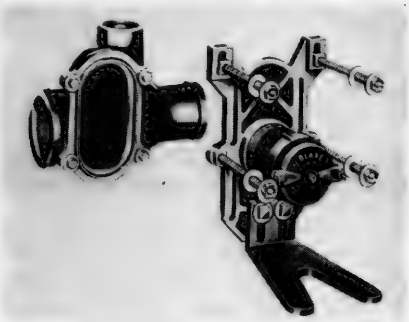
Air temperature delivered by the ventilator changes only as a result of change in room temperature. Cycles of hot and cold are sensed by the air stream thermostat and corrected before they start. All members of the "team" work together smoothly and efficiently. For full information, call your local Honeywell office, or write Minneapolis-Honeywell, Dept. HV-4-49, Minneapolis 8, Minnesota.

Honeywell

First in Controls

Closet Carriers and Fittings

Two lines of 5-inch size closet carriers and fittings, designed to accommodate a battery of as many as 18 water closets on one line or a total of 36 if installed back to back, are introduced by Blake Division, Hoffman Specialty Mfg. Corp., Indianapolis, Ind.



Practically an unlimited number of variations are possible in the two basic lines, the L-1563 and L-1564 (illustrated), and the L-1565. The L-1563 and L-1564 adjustable combination units are furnished complete with closet fitting and face plate to minimize the amount of utility space used. The L-1565 horizontal closet fitting is adaptable to a choice of company's other carriers for wide utility space where it is desirable to locate fittings in the center of utility space and carrier directly behind wall, thus providing access for walkway.

Units are available for blowout or syphon jet closets, single and double iron pipe, or soil pipe.

More information? Circle Item 51, postcard, last page.

Forged Steel Gate Valves

A line of forged steel gate valves, completely new in design and compactly built for easy installation in the most cramped quarters, is introduced by The Lunkenheimer Co., Cincinnati, Ohio.

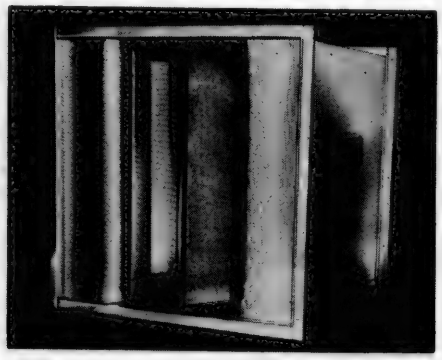
Featuring bolted bonnet design, with outside-screw rising stem, solid-wedge disc, and rolled-in seat rings, these gate valves are available with screwed or socket welding ends in sizes from ½ through 2 inches. Valves are rated for 800 lb at 850 deg F, and 2000 lb at 100 deg.

The solid-wedge disc is accurately machined and guided to a firm, tight seat without dragging across the seat rings. Both the disc and seat rings are hardened all the way through to eliminate chipping or cracking of seating faces. A 2-piece gland with ball and socket joint prevents binding due to uneven pull-up of eyebolts. The gland follower of stainless steel resists corrosion and prevents scoring of the stem.

More information? Circle Item 52, postcard, last page.

Modular Silencer

A production line modular silencer available in quantities is added to the line of Quiet-Duct silencers, for air conditioning and ventilating systems, manufactured by Industrial Acoustics Co., Inc., New York City.



Called Mod-U-Silencers, they were designed to achieve additional economies by reducing installation costs in new as well as older buildings, the company states. Available in full sizes, 24 x 24 x 30 inches; in half sizes, 24 x 12 x 30 inches; and in quarter sizes, 12 x 12 x 30 inches; each unit is rated for airflow, pressure drop, and performance by a certified, independent laboratory. Where additional performance requirements are necessary, they can be installed in parallel to handle large volumes and can be placed in series for additional noise control. Each unit is also available with slip joint connections, if desired.

More information? Circle Item 53, postcard, last page.

Larger Air-Cooled Condensers

Its line of Dricon air-cooled condensers is expanded to include the DC-30 and DC-40, nominally rated at 30 and 40 tons, respectively, by Recold Corporation, Los Angeles,

Calif. The line, which starts with a 5-ton size, was introduced a year ago. Multiple application, for supermarkets, the company states, has been particularly popular.

According to the manufacturer, units have a balanced circuiting; adjustable angle iron stand; large, slow-speed, belt-driven fans; galvanized housing; copper tube, aluminum fin coils; and motor located inside unit for weather protection.

More information? Circle Item 54, postcard, last page.

(Continued on page 120)

THE MARK OF QUALITY

BARBER COLMAN

Electronic Control APPLICATIONS

Electronic Control Centers included in more and more Automatic Controls Specifications

Probably the most important heating and air conditioning control advance in recent years is the Electronic Control Center, originated by Barber-Colman. Its advantages are so numerous that architects and engineers now include it in some form in almost every automatic controls system.

Unified source of control
Attractively custom-designed and prefabricated Control Center enables only authorized personnel to supervise and control any heating and air conditioning plant, large or small.

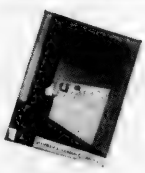
Fits all needs
Installation may call simply for temperature indication or can show complete system schematics. Electronics do the leg work . . . at a glance the operator can visualize all of the system's functions, periodically check temperatures anywhere, and remotely readjust comfort conditions. Flexible to fit any installation.

Ultimate in control . . Electronic Control Center like the Teletype Building installation, above, meets all needs of all parts of the building all the time. Forestalls discomfort by giving instant detection and correction for load and weather changes. Instantly reveals any operational failure in the comfort system.

Electronic Control Center assures automatic air conditioning control of new Teletype plant in Chicago. J. Emil Anderson, architect and industrial builder; Dell Corporation, heating and air conditioning contractors and engineers.

Economical
Control Centers can save on installation . . . often reduce initial cost of system, yet add many desirable features. Save time and manpower. Eliminate guesswork . . . reduce overheating and overcooling to substantially lower year-round fuel and power consumption.

Better control . . . Electronically
Electronic Control Centers feature the superior performance of electronic sensing with dependable positive positioning of electric motor operators. Indicating meter gives reliable position check at any time. Size and functions of Control Center may be expanded after installation. For best results *specify combined* Automatic Controls and Air Distribution by Barber-Colman.



Eight-page color brochure . . .
send this ad with your business card or letterhead
Describes and illustrates in detail the features, advantages, functions, designs, and specifications of custom-prefabricated Barber-Colman Electronic Control Centers. Brochure F-8031.

BARBER-COLMAN COMPANY

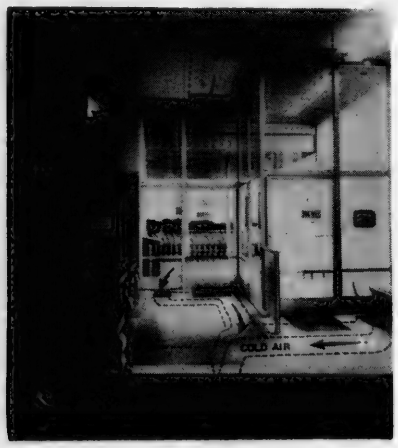
Dept. D, 1302 Rock Street, Rockford, Illinois

Small Motors • Automatic Controls • Industrial Instruments • Aircraft Controls • Electrical Components • Air Distribution Products • Overdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

(Continued from page 118)

Door Heating System

Announced by Dunham-Bush, Inc., West Hartford, Conn., is the development of a door heating system. Called Door Blanket air system, it utilizes company's Model HU heating and ventilating unit to eliminate cold



drafts where an entrance door must open and close frequently, even in cold weather.

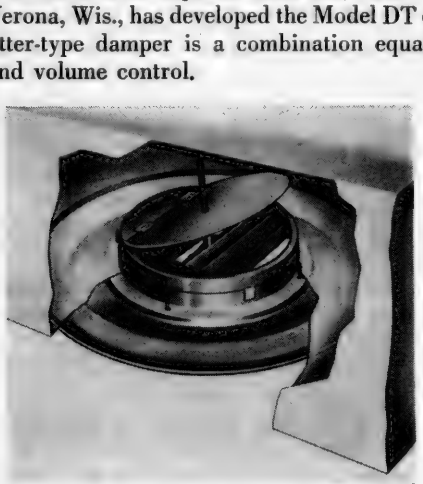
As pictured, the unit supplies air through a duct to a grille above the door, thereby blanketing the door opening with heated air. The air is pulled back to the unit from floor grilles located within the building on both sides of the entrance. This flow of air acts as an insulation medium to eliminate cold drafts and maintain an even temperature inside the building.

Since the entire system is designed to be unobtrusive, the appearance of the entrance is unchanged. System is also said to help keep the floor area dry.

More information? Circle Item 55, postcard, last page.

Damper for Exposed-Duct Diffuser

For use with the company's Model E-3 fixed-cone diffuser when installed on exposed ductwork, Carnes Corporation, Verona, Wis., has developed the Model DT damper. The splitter-type damper is a combination equalizer-deflector and volume control.



Damper is furnished with S-clips attached. For installation, all that is necessary is to insert the unit into the neck of the diffuser; the clips hold damper firmly in place. The neck of the diffuser is then fitted into duct opening and the diffuser's shoulder is secured with sheet metal screws to the stub duct or exposed ductwork, as shown in illustration. Finally, the inner cone assembly is inserted into the ceiling plate and latched by turning it clockwise.

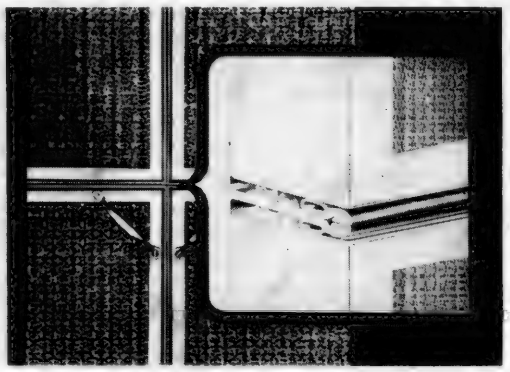
Easily adjustable from face of diffuser with a screwdriver, the damper is said to eliminate a high percentage of installation time in addition to assuring good performance through even air distribution in every direction from the diffuser.

More information? Circle Item 56, postcard, last page.

Filter Bank Assembly

A low-cost filter bank assembly with a new Seal Tight filter frame is introduced by The George Evans Corp., Moline, Ill. According to the company, this frame with its PVC gasket provides, for the first time, a lifelong, dust-tight seal between the filter and filter holding frame, thereby increasing overall filter efficiency.

The gasket pressure locks filter into its holding frame,



eliminating the need for clips, springs, latches, or locking attachments. By exerting an inward pressure toward the air filter of 4.1 lb per lineal inch, the gasket molds itself to the contour of the filter, maintaining this sealing pressure against the filter at all times. It is said to be able to withstand years of filter changes and still maintain its grip. The gasket is not affected by oil or moisture and does not support combustion.

While holding the filters by friction, the filter bank frames themselves are fastened in three places on each side with machine screw and self-locking nuts, being assembled and dis-assembled with ordinary tools. Frame is designed for use with the company's all-aluminum filters.

More information? Circle Item 57, postcard, last page.

Wet Dust Collector

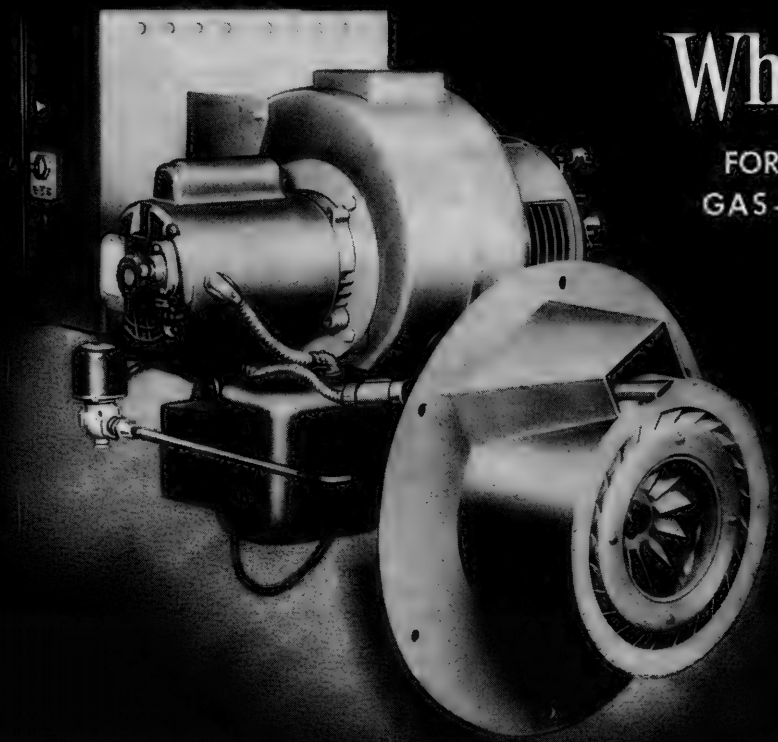
A wet dust collector, which, after extensive testing is said to provide high efficiency performance, is announced by Wheelabrator Corp., Mishawaka, Ind. It has no moving parts, no nozzles or pumps, and delivers discharged air free of entrained water.

An operating fact sheet is offered.

More information? Circle Item 58, postcard, last page.

(Concluded on page 122)

Another new development by Iron Fireman



WhirlBlast

FORCED DRAFT
GAS-OIL BURNER

Now...forced draft firing for smaller boilers

The Iron Fireman WhirlBlast gas-oil burner was created to fill the need for forced draft firing in all types of medium size boilers and particularly for the increasingly popular sealed firebox Scotch boiler. Now you can have the advantages of forced draft firing in boilers as small as 18 bhp. The necessity for costly and unsightly smokestacks has been eliminated. All air for combustion is supplied by the burner blower. No extra motors, fans or draft ports are required.

No pulsation

A newly developed firing head has solved the old problem of flame pulsation. This has been accomplished without recourse to firebox vents or other alterations.

Outstanding features of the WhirlBlast burner

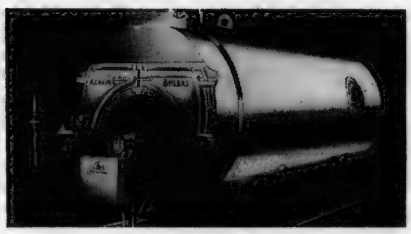
1. Switches fuels instantly. Fuels can be changed automatically with appropriate controls, or manually by the flick of a switch.

2. No high smokestack. A stub stack or vent is all that is required.

3. For all types of boilers. Fires sealed firebox boilers under pressure. Also greatly improves draft conditions in natural draft boilers.

4. Easily installed. Available with either a flange or pedestal mount. Bolts directly to the boiler front. Inverted model (with draft tube on top) permits mounting on Scotch boilers without interfering with flue doors.

5. Fuels. Fires No. 2 fuel oil and all types of fuel gas. Available in either oil, gas or dual fuel models.



Complete package ready to operate — boiler, burner, controls

Complete boiler-burner units assembled, wired and tested at the factory. Totally enclosed control panel is built into the burner. Wide range of sizes; easily specified by model number.

IRON FIREMAN®

AUTOMATIC FIRING EQUIPMENT
FOR HEATING, PROCESSING, POWER

For more information, mail coupon

IRON FIREMAN MANUFACTURING COMPANY
3068 West 106th Street, Cleveland 11, Ohio.
(In Canada, 80 Ward Street, Toronto, Ontario)

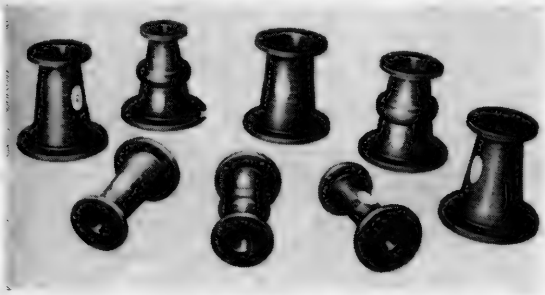
Please send more information and specifications on the Iron Fireman WhirlBlast burner.

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

(Concluded from page 120)

Rubber Expansion Joints

A line of rubber expansion joints and flexible pipe for use as flexible connections in pressure and vacuum systems handling water, brine, gases, and chemicals, is announced by General Rubber Corp., Tenafly, N. J.



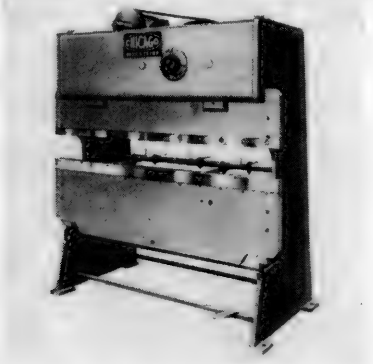
These connectors are used in power stations, air conditioning systems, water and sewerage work, etc., for recirculating water systems, hot water lines, water cooler condenser lines, boiler feed lines, etc., to absorb vibration and noise and prevent stresses due to pipe expansion and other sources.

Joints are available from ½ to 72 inches ID. Pipe is available in the same diameters in lengths to 50 ft.

More information? Circle Item 59, postcard, last page.

Press Brake Has 25-Ton Capacity

Dreis & Krump Manufacturing Co., Chicago, Ill., announces a 25-ton capacity Chicago press brake for bending and forming sheet metal. The machine will bend 60 inches of 14-gage or 72 inches of 16-gage mild steel.



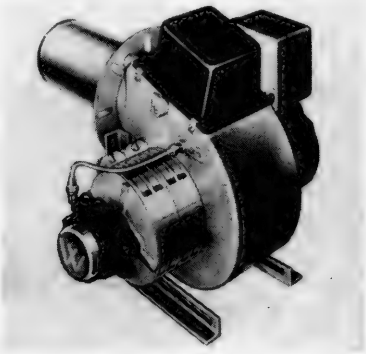
An all-steel welded frame, and deep-section bed and ram of rolled steel plate assure permanent alignment and minimum deflection under load. A variable speed drive through a disc-type friction clutch that can be jogged or slipped, gives a choice of speeds from 20 to 50 strokes a minute. Disc-type brake stops the ram as soon as clutch is released.

A 3-inch variation in the die space is effected by a manual adjustment of the bed. All bearings and gib surfaces are oiled by a one-shot lubricating system. Further details and specifications are given in Bulletin 265-58, available from the manufacturer.

More information? Circle Item 60, postcard, last page.

Oil Burner Rated 3 to 7 Gph

A burner designated as Model F by Wayne Home Equipment Co., Inc., Fort Wayne, Ind., and furnished for ratings from 3 to 7 gph supplements the company's 0.65 to 3 gph Model OE line for 1958.



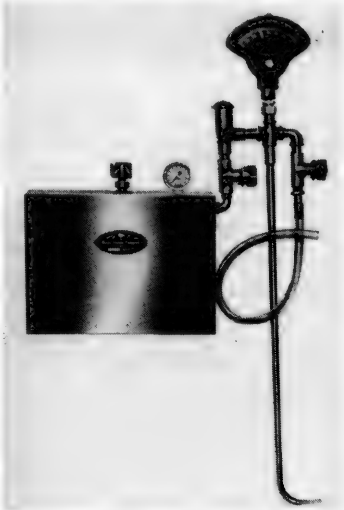
Features claimed include cast aluminum fan housing; hinged, swing-away transformer; twin nozzles; and oversized air inlet apertures. Electronic controls are installed when required.

The improved, UL-approved burner was designed for use as original equipment and for replacement in large homes and commercial buildings.

More information? Circle Item 61, postcard, last page.

Lab Water Temperature Control

Water for laboratories within plus or minus ¼ deg F is obtained with a temperature control unit manufactured by Oscar Fisher Co., Inc., Newburgh, N.Y. After an initial adjustment, variations in water temperature are automatically compensated.



At 45 psi, these controls will deliver from 6 to 125 gpm at the preset temperature. The unit consists of a motor unit containing liquid-filled thermostatic elements and a pressure stabilizing and compensating mechanism, two pressure-regulating controls, a pressure gage, volume control, and a vacuum breaker. A thermometer with phosphorescent pilot and indicating needle actuated by a liquid-filled stainless steel bulb is an integral part of the unit, which is fully enclosed in a 316 stainless steel case. Standard plumbing connections are required. Cost ranges from slightly over 200 dollars for the 6-gpm model, to almost 700 dollars for the 125-gpm unit.

More information? Circle Item 62, postcard, last page.

the new weil

SUBMERSIBLE

SUMP PUMP

A PACKAGED UNIT . . . priced lower than many conventional Sump Pumps

OPERATES UNDER WATER ●
Hermetically sealed motor with a leak-proof rotating shaft seal assures dependable performance at all times.

FOR FLOOD-PROOF OPERATION ●
If current fails moisture cannot damage pump or motor.

FOR ECONOMICAL INSTALLATION ●
Is easily installed in a metal tile or concrete sump 2' to 8' deep.

FOR GAS-TITE INSTALLATIONS ●

FOR SMALL SUMPS ●
Can be installed thru a 15" opening.

Built for – Automatic Submerged Operation

CHOICE OF 3 CONTROLS

NEW MICRO SWITCH MODEL SS-800 ILLUSTRATED

MICRO-SWITCH ●
Fool-proof and trouble-free.

ELECTRODE ●
For special installations.

FLOAT SWITCH ●
For Duplex Units.

MOTOR: 1/3 HP, 1750 RPM, 110 volt **CAPACITOR TYPE** with 8 ft. waterproof cable and plug
IMPELLER: Bronze
SCREEN: Brass
BASE: Sturdy cast-iron
DISCHARGE: 1¼"
SHAFT: Stainless steel
DIMENSIONS: Height: 12¾"; Diameter: 11"; Weight: 50 lbs.

Engineered for One Million Starts

weil PUMP CO.

1516 N. Fremont St. • Chicago 22

HARRIS

STAINLESS STEEL FLOATS

If you have a liquid level control operating under high pressure or high temperature, or in a corrosive liquid, be sure to specify Harris Type 304 Stainless Steel Floats. The inherent strength of stainless steel makes them ideal for this purpose, and all that strength has been retained with the Harris Atomic Hydrogen welding process that produces a smooth, uniformly strong and ductile weld without oxidation.

Where corrosion is more severe Harris recommends its Type 316 Stainless Steel Floats.

Take advantage of Harris' half century of float experience and consult us on any float problem.

Write for Harris Catalog with technical float data.

ARTHUR HARRIS & CO.
206 No. Aberdeen Street, Chicago 7, Illinois

FLOATS

Another

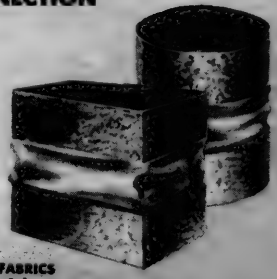
CAINS

COIL OF PROFIT

PRE-FAB-RIC

A PREFABRICATED FLEXIBLE DUCT CONNECTION

Simply pull out desired length from dispenser-type carton. (It pulls out ready to use.)
Roll into round duct or form into square duct and join. Saves 70% time over old methods.
DOUBLE-SAFE-LOCKED



A TYPE, SIZE, AND PRICE FOR ALL JOBS

THREE GRADES
Commercial - Economy
Residential

THREE FABRICS
Canvas - Asbestos
Neoprene

Union Made

SOLD ONLY THROUGH JOBBERS AND DISTRIBUTORS

Some Territories Open for Manufacturers Agents to Call on Jobbers and Dealers

CAIN MANUFACTURING CO.

1311 North 8th Avenue Phone FA 2-8353 Birmingham, Alabama

DEGREE-DAYS FOR FEBRUARY, 1958

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

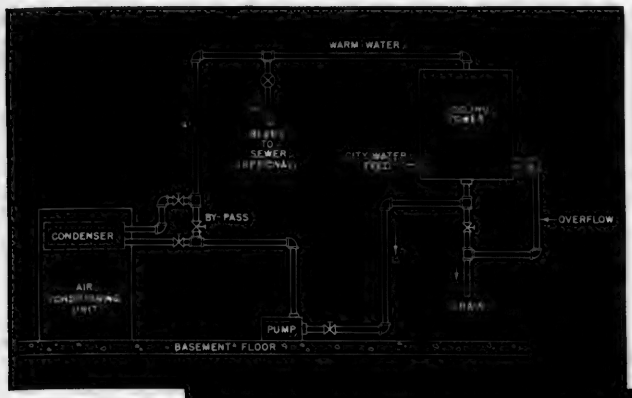
AIR CONDITIONING, HEATING AND VENTILATING's 30th Year of Publication of Monthly Degree-Day Data

City	February			Season to Feb. 28, incl., from Sept. 1		
	1958	1957	Normal	1957-58	1956-57	Normal
Abilene, Texas (A)	590	327	479	2332	1885	2250
Albany, New York (A)	1286	1006	1179	4883	5058	5056
Albuquerque, New Mexico (A)	596	468	714	3339	3029	3441
Alpena, Michigan (C)	1334	1135	1263	5392	5411	5448
Asheville, North Carolina (C)	981	505	678	3689	2625	3105
Atlanta, Georgia (A)	756	291	512	2695	1690	2269
Atlantic City, New Jersey (C)	971	721	829	3357	3125	3331
Augusta, Georgia (A)	657	251	412	2395	1465	1768
Baltimore, Maryland (C)	891	658	776	3147	2865	3193
Billings, Montana (A)	1073	1053	1089	4569	5151	5133
Binghamton, New York (C)	1244	933	1100	4719	4512	4735
Birmingham, Alabama (A)	762	281	491	2655	1633	2252
Bismarck, North Dakota (A)	1515	1432	1464	6097	6563	6652
Block Island, Rhode Island (A)	1058	858	955	3620	3763	3917
Boise, Idaho (A)	632	848	868	3989	4681	4377
Boston, Massachusetts (A)	1102	842	1002	3817	4083	4123
Buffalo, New York (A)	1242	951	1128	4716	4464	4777
Burlington, Iowa (A)	1326	881	1036	4836	4382	4641
Burlington, Vermont (A)	1456	1112	1313	5388	5542	5632
Cairo, Illinois (C)	952	553	683	3248	2708	3004
Charleston, South Carolina (C)	592	238	363	1894	1112	1466
Charlotte, North Carolina (A)	783	420	577	2870	2010	2555
Chattanooga, Tennessee (A)	865	398	588	3115	2127	2693
Cheyenne, Wyoming (A)	891	833	1044	4781	4762	5109
Chicago, Illinois (C)[b]	1253	(a)	1053	4608	(a)	4648
Cincinnati, Ohio (C)	1015	674	812	3610	3025	3465
Cleveland, Ohio (A)	1164	891	1019	4348	4036	4322
Columbia, Missouri (A)	1122	707	876	4043	3369	3934
Columbia, South Carolina (A)	671	283	443	2430	1537	1889
Columbus, Ohio (C)	1102	776	907	4115	3570	3953
Concord, New Hampshire (A)	1271	1062	1226	4893	5478	5457
Concordia, Kansas (C)	1084	797	899	4109	3892	4091
Dallas, Texas (A)	561	288	432	2006	1741	1909
Dayton, Ohio (A)	1155	829	941	4383	3860	4157
Denver, Colorado (A)	765	674	924	3932	3955	4397
Des Moines, Iowa (A)	1341	952	1092	5036	4653	4877
Detroit, Michigan (A)	1173	958	1072	4582	4370	4600
Devils Lake, North Dakota (C)	1586	1557	1576	6689	7157	7237
Dodge City, Kansas (A)	936	696	840	3780	3626	3867
Dubuque, Iowa (A)	1383	1022	1187	5467	5156	5366
Duluth, Minnesota (C)	1518	1487	1448	6616	6964	6677
Elkins, West Virginia (A)	1194	761	910	4643	3816	4182
El Paso, Texas (A)	370	205	445	2220	1866	2201
Ely, Nevada (A)	863	855	1033	5057	5204	5199
Escanaba, Michigan (C)	1353	1239	1327	5657	5797	5856
Evansville, Indiana (A)	1074	650	770	3793	3222	3424
Fargo, North Dakota (A)	1471	1465	1518	6200	6615	6851
Fort Smith, Arkansas (A)	750	423	571	2777	2381	2619
Fort Wayne, Indiana (A)	1200	903	1036	4700	4342	4601
Fort Worth, Texas (A)	592	311	446	2163	1833	1958
Fresno, California (A)	309	321	400	1946	2122	2040
Galveston, Texas (C)	379	104	247	1149	611	1005
Grand Junction, Colorado (A)	693	948	924	4058	4622	4488
Grand Rapids, Michigan (A)	1248	1024	1154	5076	4676	5033
Green Bay, Wisconsin (A)	1399	1229	1336	5794	5859	5887
Greensboro, North Carolina (A)	882	528	672	3345	2615	2991
Greenville, South Carolina (A)	777	416	552	2882	2059	2425
Harrisburg, Pennsylvania (A)	1065	809	921	4035	3782	3943
Hartford, Connecticut (A)	1153	911	1050	4381	4630	4494
Hatteras, North Carolina (C)	(a)	395	487	(a)	1536	1802
Havre, Montana (C)	1385	1319	1291	5289	6094	6044
Helena, Montana (A)	1113	1202	1165	5218	6000	5881
Houston, Texas (C)	397	119	240	1254	736	1083
Huron, South Dakota (A)	(a)	1240	1327	(a)	5737	5927
Indianapolis, Indiana (A)	1150	793	938	4400	3839	4201
Jackson, Mississippi (A)	682	241	405	2305	1437	1822
Kansas City, Missouri (A)	1053	719	851	3838	3502	3811
Knoxville, Tennessee (A)	920	425	630	3185	2198	2844
La Crosse, Wisconsin (A)	1360	1116	1280	5504	5332	5708
Lander, Wyoming (A)	893	903	1179	5303	5345	5982
Lewiston, Maine (O)	1260	1078	1243	4956	5457	5532

(a) Data not available. [b] 1957 and normal figures are for Midway Airport; 1956 figures are for Grant Park Station.

Normal figures in this table are based on 30-year period covering 1921 to 1950, inclusive, as compiled and published by the U. S. Weather Bureau.

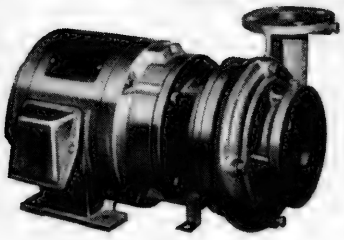
Figures in this table, with two exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Bursar, Bates College, Lewiston, Me., respectively. [Table concluded on page 126]



QUIETER PUMPS

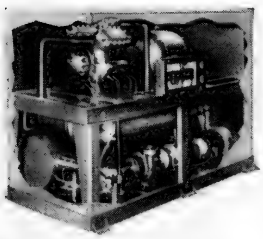
FOR COOLING TOWER APPLICATIONS

B&G 1522 CENTRIFUGAL PUMPS



B&G SERIES 1531-B CENTRIFUGAL PUMPS

Featuring vertical split case design...self-lubricating, leak-proof "Remite" mechanical seal ...latest NEMA motors. Super-finished shaft oversized for minimum deflection. Impeller is of sound hydraulic design, with balancing ring and relief holes to reduce thrust. Capacities to 1200 GPM, heads to 420 ft. Many sizes carried in factory stock.



B&G PACKAGE LIQUID COOLER

A complete cooling unit for homes, apartments, commercial and industrial buildings. Low pressure drop through evaporator—non-recycling pump down—integrated electrical control system—complete wiring—are a few of many outstanding features. Send for Bulletin HB-755.

Get rid of pump noise troubles in your cooling installations ...next time install a B&G 1522!

This pump is *really quiet*...because *both pump and motor* are equipped with long bronze sleeve bearings...and because of the noise-dampening flexible spring-type coupler.

The B&G 1522 offers an impressive number of other features for dependable, low-cost operation. The "Remite" Mechanical Seal, for example, ends leakage troubles. It's self-lubricating—harder than glass—wear-proof. The impeller is dynamically balanced for smooth, vibrationless operation... the entire bearing bracket assembly, including shaft and sleeve bearing, is interchangeable. Servicing is simple—the 1522 separates into three parts.

All these plus values cost no more—the B&G 1522 Pump is *competitively priced!* It is available as an all-iron, bronze-fitted, all-bronze or a stainless steel unit, with capacities to 150 GPM, heads to 115 ft. Available in common sizes from factory stock. Send for Catalog.

Send for your free copy of the B&G Six Step Manual for Designing Cooling Tower Systems.

BELL & GOSSETT
COMPANY

Dept. REF-4, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, W. Toronto

Degree-Day for February, 1958 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city

AIR CONDITIONING, HEATING AND VENTILATING's 30th Year of Publication of Monthly Degree-Day Data

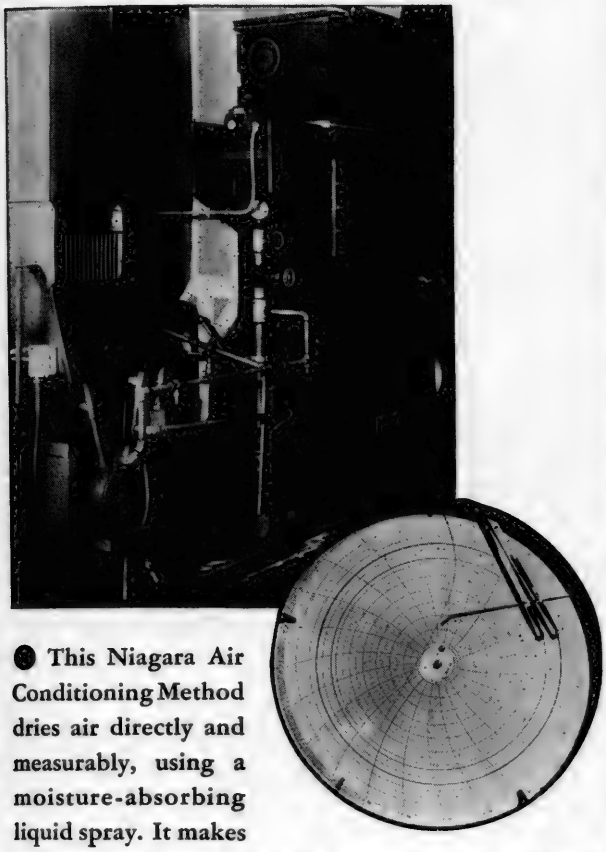
City	February			Season to Feb. 28, incl., from Sept. 1		
	1958	1957	Normal	1957-58	1956-57	Normal
Lincoln, Nebraska (C)	1137	857	1000	4406	4109	4483
Little Rock, Arkansas (A)	725	409	543	2507	2140	2441
Los Angeles, California (C)	130	146	244	549	685	1023
Louisville, Kentucky (A)	1041	644	778	3667	3102	3444
Lynchburg, Virginia (A)	930	610	722	3545	2932	3193
Macon, Georgia (A)	621	199	391	2166	1303	1712
Madison, Wisconsin (A)	1339	1047	1207	5456	5156	5331
Marquette, Michigan (C)	1352	1241	1291	5570	5748	5737
Memphis, Tennessee (A)	862	414	574	2836	2171	2547
Meridian, Mississippi (A)	676	248	413	2338	1435	1930
Milwaukee, Wisconsin (A)	1346	1036	1142	5307	5034	5089
Minneapolis, Minnesota (A)	1383	1241	1310	5567	5599	5862
Moline, Illinois (A)	1345	902	1075	5056	4590	4797
Montgomery, Alabama (A)	659	198	388	2205	1298	1769
Nashville, Tennessee (A)	950	487	636	3248	2377	2786
New Haven, Connecticut (A)	1096	875	1005	4045	4166	4263
New Orleans, Louisiana (C)	448	101	223	1349	621	993
New York, New York (C)	1035	774	904	3577	3473	3670
Newark, New Jersey	1036	795	932	3695	3628	3883
Norfolk, Virginia (A)	796	564	644	2758	2244	2630
North Platte, Nebraska (A)	1106	903	1016	4716	4770	4851
Oak Ridge, Tennessee (C)	897	438	689	3169	2170	3110
Oakland, California (A)	265	361	400	1658	2092	2029
Oklahoma City, Oklahoma (A)	818	543	630	3090	2837	2840
Omaha, Nebraska (A)	1250	904	1058	4675	4362	4728
Parkersburg, West Virginia (C)	1063	706	826	3941	3307	3599
Peoria, Illinois (A)	1271	847	1028	4689	4247	4580
Philadelphia, Pennsylvania (C)	989	710	837	3447	3140	3394
Phoenix, Arizona (A)	191	117	275	1124	1068	1255
Pittsburgh, Pennsylvania (C)	1082	757	879	3990	3469	3761
Pittsfield, Massachusetts (A)	1326	1070	1212	5197	5316	5415
Pocatello, Idaho (A)	778	929	1022	4861	5317	5082
Portland, Maine (A)	1283	1062	1218	4825	5430	5367
Portland, Oregon (C)	451	589	594	2510	3281	2985
Providence, Rhode Island (A)	1124	866	1019	4035	4272	4339
Pueblo, Colorado (A)	752	643	865	3779	3796	4248
Raleigh, North Carolina (A)	819	495	577	3061	2347	2434
Rapid City, South Dakota (A)	1201	1042	1151	4762	5241	5314
Reading, Pennsylvania (C)	1037	785	902	3810	3613	3785
Red Bluff, California (A)	353	371	423	2113	2012	1982
Reno, Nevada (A)	658	724	804	4034	4482	4190
Richmond, Virginia (A)	871	600	708	3282	2749	3068
Rochester, New York (A)	1269	979	1148	4841	4676	4870
Roswell, New Mexico (A)	552	357	566	2823	2502	2768
Sacramento, California (C)	286	328	403	1884	1978	1997
St. Joseph, Missouri (A)	1182	827	820	4373	3974	3646
St. Louis, Missouri (C)	1074	667	792	3682	3266	3478
Salt Lake City, Utah (A)	649	685	885	4084	4337	4358
San Antonio, Texas (A)	419	126	293	1505	1000	1355
San Diego, California (A)	117	146	247	538	673	1042
Sandusky, Ohio (C)	1173	912	997	4425	4068	4235
San Francisco, California (C)	242	302	336	1404	1600	1679
Sault Ste. Marie, Michigan (A)	1499	1344	1442	6052	6348	6369
Savannah, Georgia (A)	584	193	330	1989	1146	1429
Scranton, Pennsylvania (A)	1225	946	1028	4716	4597	4423
Seattle, Washington (C)	413	634	602	2492	3287	3037
Sheridan, Wyoming (A)	1079	1093	1170	4894	5428	5607
Shreveport, Louisiana (A)	565	249	386	1990	1498	1784
Sioux City, Iowa (A)	1314	1008	1170	5036	4901	5301
Spokane, Washington (A)	697	1011	988	4230	5297	4936
Springfield, Illinois (A)	1170	799	907	4348	3947	4021
Springfield, Missouri (A)	1011	622	790	3667	3250	3624
Syracuse, New York (A)	1266	965	1117	4833	4680	4682
Toledo, Ohio (A)	1193	934	1056	4704	4433	4617
Topeka, Kansas (C)	1037	771	851	3883	3640	3830
Trenton, New Jersey (C)	1024	783	904	3709	3554	3760
Tulsa, Oklahoma (A)	834	505	644	2964	2701	2882
Utica, New York (O)	1257	1122	1181	5096	5316	4966
Valentine, Nebraska (A)	1245	1034	1100	4994	5205	5170
Walla Walla, Washington (C)	494	751	748	3117	4171	3737
Washington, D. C. (C)	944	652	770	3422	2988	3258
Wichita, Kansas (A)	982	705	778	3715	3472	3564
Williston, North Dakota (C)	1407	1391	1442	5861	6537	6642
Winnemucca, Nevada (A)	670	741	854	4390	4846	4602
Yakima, Washington (A)	615	904	862	3901	4995	4512

For footnotes, see page 124

EXACT CONTROL

of Moisture Content

To Improve Your Product or Protect Your Materials or for Processes or Tests



● This Niagara Air Conditioning Method dries air directly and measurably, using a moisture-absorbing liquid spray. It makes humidity control a separate function from lowering or raising temperatures and gives you precise control with thermostats alone; no moisture-sensitive devices are needed. You have simpler, more trustworthy, less expensive control instrumentation. Niagara precise-control installations have the best record for reliability.

Niagara Air Conditioning provides you with any temperature and relative humidity you need. Using "Hygrol" absorbent, it is not expensive to operate, saving the refrigeration commonly used to condense moisture and making re-heat unnecessary in most cases. It gives large capacity with compact, easily-maintained equipment. Ask for Descriptive Bulletins #112 and #121. Address Dept. HV-4.

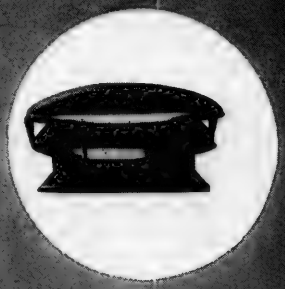
NIAGARA BLOWER COMPANY

405 Lexington Ave. New York 17, N. Y.

District Engineers in Principal Cities of U. S. and Canada

ACCEPTED Allen ROOF VENTILATION

Whatever your ventilating needs, be sure to see how Allen equipment can meet your requirements efficiently and economically.



NEW "I-LINE" for EYE APPEAL

The new "I-Line" provides an attractive low contour, assuring maximum capacity or efficiency with the minimum over-all height.

POWERFUL "VD" for HIGH VELOCITY

By moving a large volume of air at high velocity, this Vertical Discharge fan keeps fumes from sifting back into building.

Allen

... is prepared to investigate ventilating problems and plan systems for the efficient removal of heat, fumes, vapor or dust.

WIND-DRIVEN TURBINES

Three types of Allen turbines take full advantage of the economy of natural air movement.

EXHAUST FANS

Remote drive Staxauster is designed to handle corrosive fumes, and/or high temperature air.

THE ALLEN LINE

Write today for catalog that gives specifications and performance data on these and other units in the Allen ventilator line.

ALLEN

ALLEN COOLER & VENTILATOR, INC.
ROCHESTER, MICH.

Roof Ventilators for Every Commercial and Industrial Need

REPRESENTATIVES IN PRINCIPAL CITIES

Five important reasons why

Power Line

best solves your industrial ventilation problems:

1. Complete line: Broadest product line of air-moving equipment for every industrial requirement.

2. Certified performance: All Power Line Fans are rated by PFMA and by NAFM.

3. Backed by 33 years of specialization in manufacture of highest quality ventilation equipment.

4. Competitively priced to give you important cost savings in initial investment and in maintenance. You get the precisely right product to fit your requirements. You don't over-buy with equipment too large or under-buy with equipment too small.

5. Sold only through qualified ventilation specialists. You get expert technical advice and service from the survey of your requirements right through to the completion of your installation.

YOURS ON REQUEST: Big 20-page Power Line Catalog gives complete facts about industrial ventilation, including selection of proper type and size of fan, calculation of duct resistance, and installation procedures, plus features, dimensions, specifications and performance data. Without obligation write for your free copy of Catalog No. 99A.

POWER LINE FAN COMPANY, INC.

Subsidiary of Chelsea Products, Incorporated 639 South Avenue, Plainfield, New Jersey

NEW CATALOGS

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

INDIRECT TYPE WATER HEATERS — For those concerned with the problem of furnishing hot water for large commercial, industrial, or institutional buildings, Bell & Gossett Co., Morton Grove, Ill., has published a new booklet on indirect type instantaneous water heaters and their application, selection and installation. Indirect type water heaters, it is explained, obtain heat from the same hot water or steam boiler that furnishes heat for the building. Covered in detail is a simplified procedure for estimating hot water requirements in all types of buildings.

Circle **Item 63** on Inquiry Card

AMMONIA VALVES, ACCESSORIES — Catalog No. 202 covering ammonia valves and accessories for refrigeration and industrial application is published by Henry Valve Co., Melrose Park, Ill. New products added to the company's line include shut-off valves and purge, oil drain, and gage mounting valves of forged steel. Other additions include forged steel unions and flanges, ductile iron shut-off valves and packaged dual relief valve assemblies.

Circle **Item 64** on Inquiry Card

PIPE BENDING MACHINES—A 34-page booklet, entitled Please Take a Peek, published by Wallace Supplies Mfg. Co., Chicago, Ill., shows "in plant" photos of various applications of the company's pipe bending machines. Included are large and small sizes of rotary benders, ram benders, and roll benders.

Circle **Item 65** on Inquiry Card

AUTOMATIC CONTROLS—A 60-page catalog, No. 858, describes the company's automatic controls for pressure, temperature, liquid level and mechanical movement. Catalog, published by The Mercoid Corp., Chicago, Ill., also presents data on relays and both magnetic and tilting-type mercury switches. Book is fully illustrated, and provides ordering and application information.

Circle **Item 66** on Inquiry Card

UNBREAKABLE PLUMBING FIXTURES — Aluminum Plumbing Fixture Corp., Burlingame, Calif., announces a catalog which shows its expanded line of Super Secur Ware unbreakable plumbing fixtures. These fixtures are recommended primarily for institutional use, or wherever fixture breakage is possible.

Circle **Item 67** on Inquiry Card

(Continued on page 130)

BUY SPORLAN *throughout* for RIGHT DOWN-the-LINE PEAK PERFORMANCE!

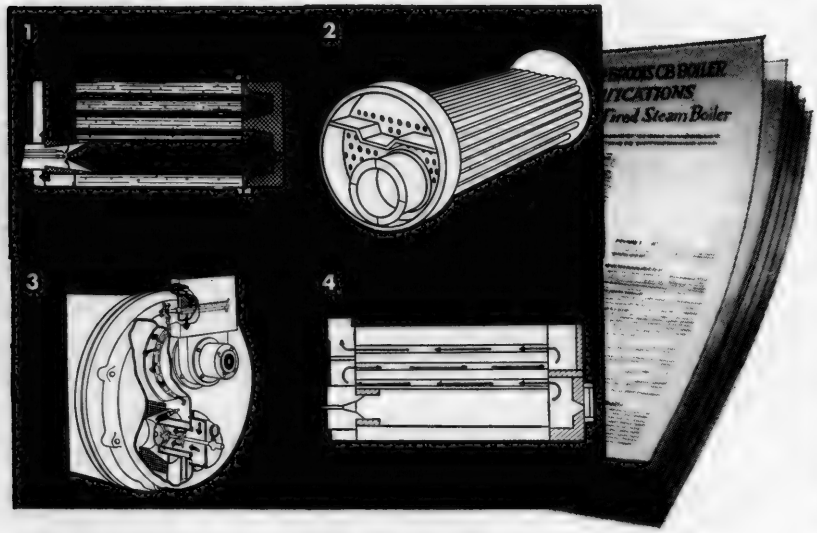
Regardless of the installation or size... *whether it's commercial, air conditioning or ammonia,* there's a perfect combination of Sporlan Catch-Alls, See•Alls, Solenoid Valves, Thermostatic Expansion Valves, Refrigerant Distributors and Level-Master Controls that is scientifically engineered to give you a hook-up with right down the line peak performance every time!

Ask your Sporlan wholesaler for Catalog 58, today.

SPORLAN VALVE COMPANY
7525 SUSSEX AVENUE ST. LOUIS 17, MO.

EXPORT DEPT. AD. AURIEMA, INC., 85 BROAD ST., NEW YORK 4, N. Y.

Before you specify any boiler consider how Cleaver-Brooks standards of quality . . .



Assure performance that satisfies clients

1 **Four-pass,** fire tube construction. Longer gas travel scrubs more heat from flame, assures high heat transfer and lower fuel costs.

2 **Five square feet** of heating surface per boiler horsepower makes possible many years of uniformly high operating efficiency, low maintenance.

3 **Forced draft,** controlled combustion maintains proper fuel-air ratios, highest efficiency regardless of wind or weather... requires less maintenance than other air-control methods.

4 **Updraft construction,** low furnace location places hot combustion gases low in boiler for greater safety.

These design standards are the basis for peak operating efficiency and greater safety. What's more, Cleaver-Brooks boilers save installation time and money. These fully packaged boilers arrive fully assembled, ready to install. Each boiler is fully fire-tested at the factory under load, tuned to peak economy. Starting service and on-the-job operator training by authorized field engineers further decrease overall costs, promote customer satisfaction.

Consider all the advantages; you'll see why it pays to specify a Cleaver-Brooks. Choose from 19 sizes, 130 models, 15 to 600 hp, oil, gas and combination oil/gas fired, steam or hot water.

See your Cleaver-Brooks agent for additional information. or write Cleaver - Brooks Company, Dept. D, 315 E. Keefe Ave., Milwaukee 12, Wisconsin.

Mail coupon for free Boiler Layout Guide

CLEAVER-BROOKS COMPANY
Dept. D, 315 E. Keefe Avenue
Milwaukee, Wisconsin

Please send me your CB Layout Guide

Name .....
Firm .....
Street & No. .....
City ..... State .....

Cleaver Brooks®

NEW CATALOGS

(Continued from page 128)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

CENTRALIZED ELECTRONIC CONTROL—Centralized electronic control of air conditioning is described in a bulletin from Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., as now being available for the smallest commercial buildings. The bulletin, AIA File No. 30-E, includes information on the company's Air Conditioning Selector for single-zone control, and Control Master panels for multi-zone control of smaller buildings.

Circle **Item 68** on Inquiry Card

PROPELLER FAN COOLING TOWERS—The complete line of propeller fan cooling towers manufactured by Halstead & Mitchell, Pittsburgh, Pa., is described in Bulletin EC-500. Belt-drive, direct-drive and take-apart models in capacities of 2 through 125 tons are shown and described in the bulletin which gives complete rating data for proper selection under varying conditions. As a further aid, bulletin contains 12 installation suggestions that apply to all towers.

Circle **Item 69** on Inquiry Card

HIGH VELOCITY SYSTEMS—A 52-page catalog (TA-100) available from Air Devices Inc., New York, N. Y., contains complete engineering and performance data on 19 different types (106 sizes) of Thermotank-Agitair high velocity units for ceiling, perimeter, and interior zone all-air high velocity air conditioning systems. Performance data for each type is in table form. Duct design, and typical system layouts and installations are illustrated.

Circle **Item 70** on Inquiry Card

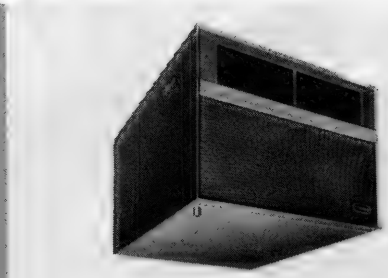
PLUMBING VALVES AND FITTINGS — In a 32-page booklet, Bridgeport Brass Co., Bridgeport, Conn., presents its price list, No. 79, covering plumbing brass goods, air and vacuum valves, and flexible copper supplies and fittings. Identifying illustrations are included.

Circle **Item 71** on Inquiry Card

IMPULSE STEAM TRAPS — Yarnall-Waring Co., Philadelphia, Pa., presents Bulletin T-1742 (57) giving detailed information on its line of impulse steam traps. Typical installations for all series are shown with useful dimension, capacity, weight, and price data.

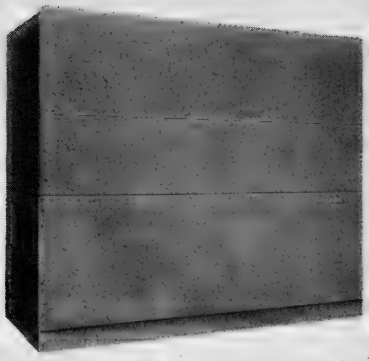
Circle **Item 72** on Inquiry Card

(Continued on page 132)



5 & 7½ TON CEILING MOUNTED UNITS

The most compact unit of its size in the industry. Horizontal water cooled unit installs anywhere, frees all floor space. Small parts can be replaced on job. One man can remove compressor from ceiling location without disconnecting ducts or removing unit. All copper condenser, sealed fan bearings, high capacity ratings.



50 & 60 TON SELF CONTAINED

Compact as a packaged unit, flexible as a central station system. Self contained, all piped, wired, factory assembled. Rugged construction. High static pressure availability for long duct runs. Heavy duty fans with lifetime sealed bearings that never need oiling.

YOU KNOW YOU CAN COUNT ON TYPHOON!

Typhoon adds to your reputation by turning in the kind of performance your clients demand . . . and more! Each and every Typhoon unit is designed and built to stand up to extreme weather conditions and sudden severe temperature changes without strain or breakdown. Typhoon quality begins with Power Reserve—superior components and oversize parts to deliver beyond rated capacity. All copper condensers in water cooled units, largest coil surfaces, and rugged 11 and 14 gauge metal in durable lifetime cabinets. And Typhoon dependability is enhanced by the flexibility of large and small units that can be easily adapted, split or combined to fit any and all installations with maximum ease and economy. Air cooled units from 2 tons to 20 tons, both packaged and as split systems. Water cooled units from 3 tons to 60 tons. Packaged water chillers, 2 tons to 50 tons. Air cooled condensing units to 20 tons, water cooled to 60 tons. For quality, performance, versatility . . . next time specify Typhoon, the industry's most complete line of packaged air conditioners.

TYPHOON
DIVISION OF HUPP CORPORATION

Typhoon Air Conditioning Company
505 Carroll Street, Brooklyn 15, New York

Please send me full product literature on the Typhoon line.

Name_____

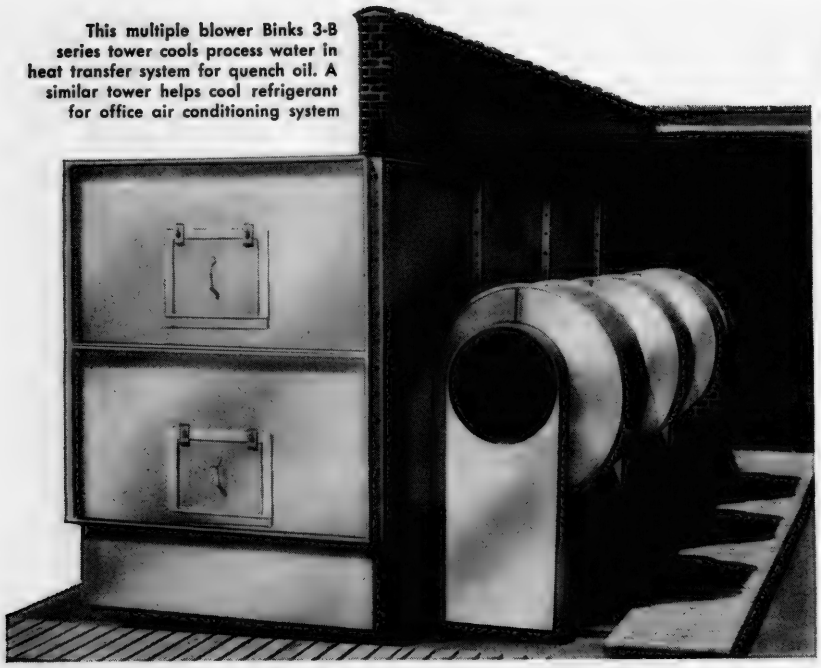
Address_____

_____

City_____ Zone_____ State_____

8D-2

This multiple blower Binks 3-B series tower cools process water in heat transfer system for quench oil. A similar tower helps cool refrigerant for office air conditioning system



BINKS TOWERS AT McGILL MANUFACTURING CO., INC.

cut cooling water usage 95% ...save $6,000 annually

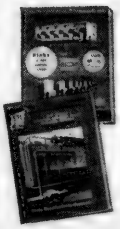
"We were using 2,840 cubic feet of cooling water every day for our manufacturing processes and air conditioning," reports Mr. Max Boté, plant engineer at McGill Manufacturing Company, Inc., Valparaiso, Indiana. "Since installing two Binks cooling towers we use less than 200 cubic feet."

Control quench oil temperature
Bearing parts manufactured by McGill are heat treated. At 1500° F., the parts are cooled in quench oil which is held at 110° F. by a water-cooled heat transfer system. Water for the system is cycled through a Binks 3-B series cooling tower where its temperature is lowered 8° F. under all climatic conditions. A similar tower helps cool Freon 22 in the office air conditioning system.

Whisper-quiet operation
Tip speed of the squirrel cage blowers is one-third that of equal capacity propeller fan units. Their quietness permits installation next to windows or in building wells.

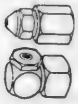
Minimum maintenance needed
All panels are heavily galvanized. Outside, they receive two coats of aluminum paint; inside, a durable zinc chromate coating. Blowers and motors are placed outside the moisture laden air stream. Decking is of heart redwood.

Send for complete data
Ask your Binks Branch Office, or write direct for a copy of Bulletin 477-A and 333. Binks engineers will be glad to answer your questions and help solve your particular cooling problems. There is no obligation.



8151

Binks
EVERYTHING FOR WATER COOLING



A COMPLETE LINE OF NATURAL DRAFT AND MECHANICAL DRAFT COOLING TOWERS AND INDUSTRIAL SPRAY NOZZLES

Binks Manufacturing Company
3120-38 Carroll Ave., Chicago 12, Ill.

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

NEW CATALOGS

(Continued from page 130)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

ALUMINUM AIR DUCTS—Latest findings on the control of duct noises are among the subjects covered in a comprehensive book on aluminum air ducts just published by Reynolds Metals Co., P. O. Box 1800-A, Louisville, Ky. Titled Reynolds Aluminum Air Duct Guide, the 130-page book was prepared with the assistance of authorities on the subject, and contains detailed chapters on engineering, drafting, estimating, fabricating and installing aluminum ductwork. Residential, commercial and industrial applications are considered. The book will be sent without charge to engineers, designers, architects, fabricators, installers, and sheet-metal men who request on company letterhead.

INDUSTRIAL THERMOMETERS—A new catalog, devoted exclusively to its complete line of industrial thermometers, is available from Weksler Thermometer Corp., of Freeport, N. Y. Known as Catalog No. 125A, the issue contains all pertinent engineering data about the units, such as case and socket dimensions, as well as a complete set of standard temperature ranges and scale divisions. The inclusion of this material permits more accurate, time-saving selection of the correct instrument and fittings for a specified use.

Circle **Item 73** on Inquiry Card

CLOSE-COUPLING MOTORS—A folder published by Franklin Electric Co., Inc., Bluffton, Ind., illustrates how close-coupling of electric motors with machined seal cavities to pumps reduces weight, lowers parts inventory, and assures alignment by eliminating outboard bearings, stub shafts and couplings. The technique of motor-product integration is being utilized by many pump, compressor, appliance, and shop machine manufacturers, the company states.

Circle **Item 74** on Inquiry Card

PURGE SEQUENCE VALVE — A flyer available from Atlas Valve Co., Newark, N. J., describes a new steam purge sequence valve. This valve provides a secure and hazard-free means of purging or scouring oil burner tips in industrial installations, the company states. Sheet contains diagrams and a photograph of the valve, which dictates an inflexible and irreversible sequence in the control of atomizing steam, fuel oil, and steam for purging burner tips.

Circle **Item 75** on Inquiry Card

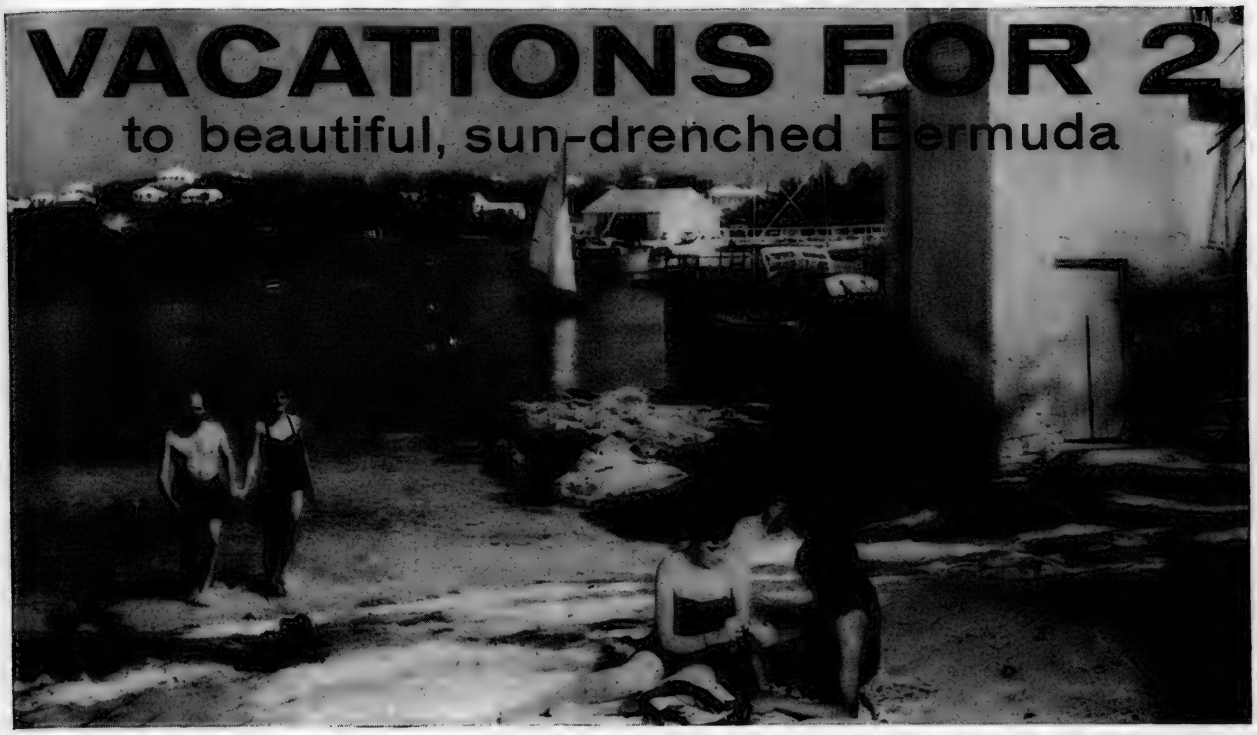
(Continued on page 134)

Attention Package and Central Station **AIR CONDITIONING DEALERS!**

Your last chance to win one of many exciting all-expense paid 7-day

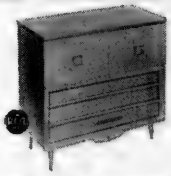
VACATIONS FOR 2

to beautiful, sun-drenched Bermuda



EARN OTHER VALUABLE PRIZES, TOO! IN WORTHINGTON'S "Prize Flight to Profit" Program

RCA Transistor Portable Radio



RCA High Fidelity Console Phonograph

South Bend Deluxe Spinning Kit

Keystone 8 MM Rollfilm Movie Camera

Annis Mink Stole

Spalding Autographed Golf Set

Mercury Outboard Motor

Color TV

Hurry! Hurry! Hurry! You can easily be the lucky winner of one of the seven-day all-expenses-paid-for-two trips to Bermuda! And while you're trying for this exciting vacation of a lifetime you can be earning valuable prizes in the Worthington Air Conditioning "Prize Flight to Profit." Easy, too. No slogans, nothing to write. No large orders required—no stocking necessary. For full details on the most salable product line available and how you can be a winner, check the yellow pages for the name of your local Worthington air conditioning wholesaler. Or fill in and mail the coupon. Don't delay . . . time is running out!

WORTHINGTON CORPORATION
AC & R DIVISION, SECTION 12-3
AMPERE STATION, EAST ORANGE, NEW JERSEY
"PRIZE FLIGHT TO PROFIT"

Please send me full details on your "Prize Flight to Profit" program

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

WORTHINGTON

"They're Swartwout Ventilators . . . one of our most profitable investments for employee comfort and efficiency!"

"Adequate ventilation has definitely improved employee efficiency and morale. It's turned out to be just as important as correct lighting, safety devices and cleanliness. As a result our production costs are lower."

Management is fast becoming aware of the benefits to be obtained from engineered ventilation. Many old plants need new more efficient systems. New plants *must* have them.

Whatever type or size of ventilation job you're interested in, you can be sure there's one or more Swartwout Roof Ventilators that will economically supply fresh air — rain or shine, windy or calm. They're noted for maximum capacity per roof opening size, weatherproofness and economical installation.

Our ventilation engineers will work with you on unusual problems. As a guide to more profitable ventilator installations, send for Catalog 353 today.

The Swartwout Co.
Ventilation Engineering
18571 Euclid Avenue Cleveland 12, Ohio

NEW CATALOGS

(Continued from page 132)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

AIR CONDITIONING SCHOOL — Form No. AC-963 is issued by Training School, National-U.S. Radiator Corp., Johnstown, Pa., describing the company's Air Conditioning School. It covers everything that a contractor or wholesaler might want to know in order to decide whether or not he should attend the school. According to the booklet, the school is open to any qualified heating or air conditioning contractor or wholesaler. The course is covered in one week, and the schedule of classes indicates a good balance between classroom lectures and practical training with actual equipment. There is no tuition charge for the course, and general information on hotel and motel accommodations is given in the literature.

Circle **Item 76** on Inquiry Card

COAL-FIRED PACKAGE BOILERS — The Coal-Pak Automatic series of bituminous coal-fired package boilers is described in 10-page Bulletin 1100 released by The International Boiler Works Co., East Stroudsburg, Pa. Available for low or high-pressure hot water or steam systems, these package boilers are supplied complete with combustion controls, automatic coal feed, and ash removal system for burning low-cost bituminous coal cleanly and efficiently.

Circle **Item 77** on Inquiry Card

HIGH PRESSURE UNITS — Publication was announced by M. Blazer & Son, Passaic, N. J., of Bulletin AC-4 describing its line of Tru-Air high pressure air conditioning units. Bulletin illustrates company's method of assembling blower sections, coil sections, and plenum sections to sizes ranging from 4950 cfm at 3 inches s.p. and 30 tons to 28,160 cfm at 9 inches s.p. and 185 tons.

Circle **Item 78** on Inquiry Card

PRESSURE REDUCING VALVES — Six-page Bulletin J-160 from Jordan Industrial Sales Div., OPW Corp., Cincinnati, Ohio, gives complete information on Sliding Gate pressure reducing valves designed to give dead end shut-off on all fluid services. Bulletin describes valve features, design improvements, and method of operation. It contains flow capacity charts, dimensional drawings, control ranges, and material specifications.

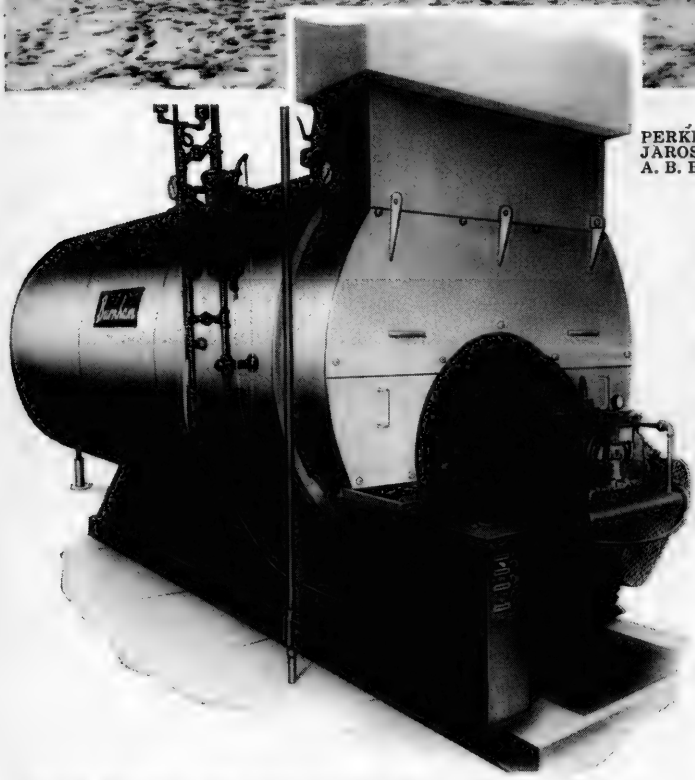
Circle **Item 79** on Inquiry Card

(Continued on page 136)

MODERN HEATING for a MODERN SCHOOL

Edgewood Elementary School, Scarsdale, New York

PERKINS & WILL ..... *Architects — White Plains, New York*
JAROS, BAUM & BOLLES .. *Consulting Engineers — New York City*
A. B. BARR & CO. ..... *Heating Contractors — Yonkers, New York*



Stock Boilers both "Compact" and "Scotch Type" are available for prompt shipment.

Scarsdale School heats with BURNHAM Packaged Scotch Type Boilers

Up-to-date in every detail of equipment, the Edgewood Elementary School uses two BURNHAM Packaged "Scotch Type" Steel Boilers for efficient heating. Another Scarsdale elementary school, Greenacres, also uses the same design of heating plant and BURNHAM Boilers. These give outstanding performance and economy for good reasons. A carefully engineered and designed Scotch Type Boiler to S.B.I. Ratings — Built to and exceeding ASME Code Construction together with a proven Burner make this a perfectly matched team. BURNHAM "Scotch Type" Package Boilers can be supplied to you in capacities of 2,600 to 35,000 sq. ft. E.D.R. steam and 4,680 to 56,000 sq. ft. E.D.R. water, net S.B.I. ratings.

Burnham Corporation

Steel Boiler Department
Irvington, New York

MEMBER SBI

Sales Representatives throughout the U.S.A.

Burnham Corporation ACH-48
Steel Boiler Dept.
Irvington, New York

Please give me, without obligation, full ratings and data on:
Scotch Type Boilers ☐ Boiler-Burner Packages ☐ Compact Boilers ☐

Name .....

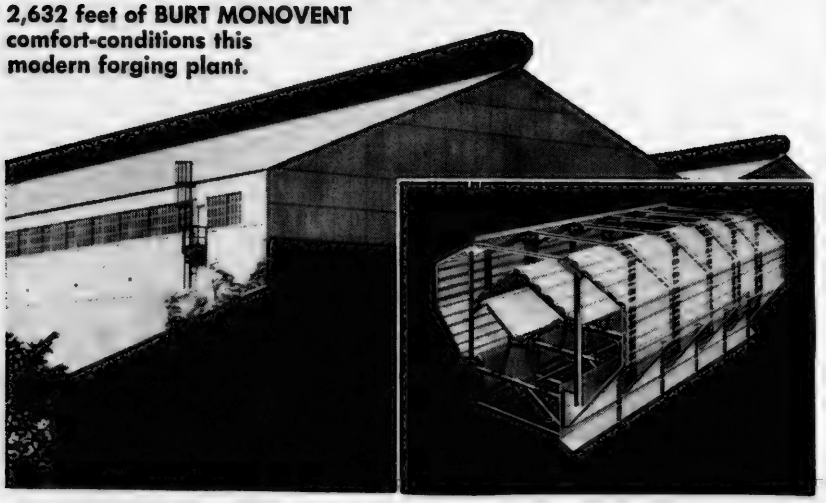
Address .....

City ..... State .....

BURT MONOVENT GIVES YOU .....

MORE AIR FOR YOUR MONEY

2,632 feet of BURT MONOVENT comfort-conditions this modern forging plant.



- INSTALLS ON ANY TYPE ROOF
- SIZES FROM 4" to 96"
- STURDY CONSTRUCTION FOR LONG LIFE
- MINIMUM MAINTENANCE

Where high heat or fumes dictate the removal of large volumes of air, the Burt Monovent Continuous Ridge Ventilator exhausts more air per dollar than any other type. It converts the roof ridge into a quick-acting, giant air valve that ventilates the entire structure uniformly by gravity. The Monovent is serving industry economically in continuous runs from one foot to 1,000 feet. It may be *your* best choice too.

Send for **FREE** *Data Book!*

Write for Burt Data Book SPV-6. It supplies quick data on Burt's efficient, low-maintenance Monovent.

FAN & GRAVITY VENTILATORS • LOUVERS • SHEET METAL SPECIALTIES

The Burt Manufacturing Company

49 E. South St. Akron 11, Ohio

MEMBER POWER FAN MANUFACTURERS ASSOCIATION

NEW CATALOGS

(Continued from page 134)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

POWERED SEWER CLEANERS — A 4-page bulletin from Power Drive Inc., Chicago, Ill., describes three of the company's powered sewer and drain-cleaning devices: Power-Matic Model 251 for motor-operated automatic cleaning of sewer pipe up to 4-inches with ½-inch cable, and up to 6-inches with ⅝-inch cable; Sink Master Model 250 for powered cleaning of sluggish drains and supply lines up to 2 inches; and Sewer Master Model 252 for gas-engine powered clearing of sewer pipes 8 inches and larger.

Circle **Item 80** on Inquiry Card

BRONZE VALVES— Hammond Brass Works, Hammond, Ind., announces publication of a comprehensive 1958 catalog covering its complete line of bronze valves for industrial, government specification, commercial, domestic, and original equipment application. Separate sections are devoted to the company's line of heavy duty valves, heating specialties, and solder joint valves.

Circle **Item 81** on Inquiry Card

FEED WATER REGULATOR—A 4-page brochure from Bailey Meter Co., Cleveland, Ohio, describes company's thermo-hydraulic-type regulator for control of feed water to small boilers. Construction, operation, and dimensions are provided in Product Specification M85-1, together with helpful ordering information.

Circle **Item 82** on Inquiry Card

TOILET COMPARTMENTS—A new edition of the company's Toilet Compartment Catalog, No. T.C. 58, has been issued by Cutler Metal Products Co., Camden, N. J. The catalog contains complete description, specifications, and construction details of ceiling-hung, floor-supported, and overhead-braced toilet compartments as well as hospital cubicles and dressing compartments. Color specification page is included.

Circle **Item 83** on Inquiry Card

ADJUSTABLE STEEL SCAFFOLDS — A 4-page brochure published by Baker-Roos, Inc., Indianapolis, Ind., describes features and applications of the company's adjustable lightweight steel scaffolds. Construction of scaffolds permits height adjustment in 3-inch increments.

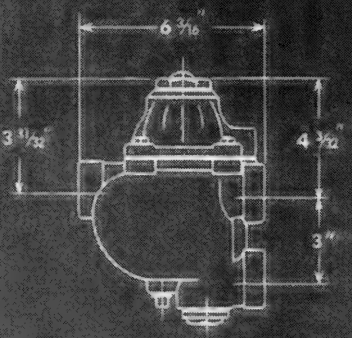
Circle **Item 84** on Inquiry Card

(Continued on page 138)

MARSH No. 12

Float and Thermostatic Trap

Marsh No. 12, for 0-15 psi, and No. 512, for 15-125 psi, are available in either ¾" or 1" pipe size. Note two optional outlet openings.



. . . The most dependable trap you can use

There are many jobs that only a float *and* thermostatic trap can handle properly . . . and in the Marsh No. 12 you have the most respected F & T trap ever developed.

Here is a trap that counts its users in thousands. Repeat orders are the rule because men who know have discovered that no other trap can quite duplicate its absolutely dependable, trouble-free performance in removing all air and condensate from steam mains, branches, risers, unit heaters, coils, and similar applications.

Two precision-built assemblies accomplish this. All condensation is discharged by the float-operated valve located at the low point in the trap body. All air is vented through the by-pass by the action of the thermostatic diaphragm, but this is one of those Marsh diaphragms that closes the valve immediately in the presence of steam. In fact the accuracy of response is the attribute that distinguishes the Marsh thermostatic element. It gets the air out and keeps the steam *in!* Another big feature is the straight through design which eliminates troublesome excess piping.

No. 12 is your F & T trap for those low pressure applications — up to 15 psi W.S.P. but its identical-in-operation companion, No. 512, covers the working pressure range of 15 to 125 psi. There is a Marsh trap for every low or medium pressure application.

Write for catalog 76-H covering Marsh heating specialties

MARSH HEATING EQUIPMENT CO. *Sales affiliate of Jas. P. Marsh Corporation*

Dept. U, Skokie, Ill. Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd St., Edmonton, Alberta

Manufacturers of gauges, thermostatic regulating valves, Solenoid valves, heating specialties

MARSH *Heating Specialties*

SINCE 1865

for DUST

CONTROL

install

FLEXAUST® HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of dust collecting uses, particularly good for elbows and moving hoods.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

Write for details today
Distributors in all principal cities

THE FLEXAUST COMPANY
Dept. HV-4
[illegible] PARK AVE. NEW YORK [illegible] N. Y.

NEW CATALOGS

(Continued from page 136)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

VENTILATING UNITS— General Blower Co., Morton Grove, Ill., has added a new bulletin to its Lungs for Industry program. Bulletin UVS-104 covers the company's line of belt-driven ventilating units with either forward curve wheels or backward blade non-overloading wheels. It also includes complete performance tables, engineering data, and selection and installation information.

Circle **Item 85** on Inquiry Card

RETURN VENT SILENCERS—A brochure describing the Quiet-Vent silencer which filters out sound from return air vents is available from Air Conditioning Department, Industrial Acoustics Co., Inc., New York, N. Y. These silencers, which prevent the transmission of noise without impeding air passage, are finding wide usage where conversational privacy and freedom from disturbing noises are of utmost importance.

Circle **Item 86** on Inquiry Card

WATER SYSTEM RELIEF VALVES — A 4-page bulletin, No. LL-5990, describing its complete line of water system relief valves is announced by Mansfield Sanitary, Inc., Perrysville, Ohio. Folder lists 2 Models, Nos. 451 and 452, for pressure-only protection in cold and hot water lines. For both temperature and pressure relief, it describes Nos. 453, 494 and 495.

Circle **Item 87** on Inquiry Card

STEAM TRAP TEST—A simple way of detecting faulty steam traps is described in a 4-page bulletin offered by Tempil Corporation, New York, N. Y. The method is based on the use of company's temperature indicating crayons to discover whether or not the temperature of the return line below the trap is lower than the temperature of the steam supply line above the trap.

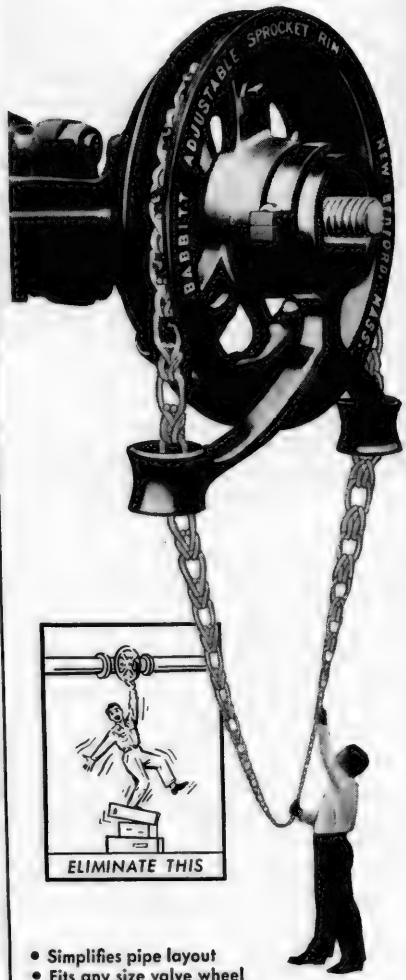
Circle **Item 88** on Inquiry Card

RADIANT HEATING AND COOLING — The Radiant Heating & Cooling Institute, Los Angeles, Calif., has published a brochure explaining key features of its system. The Institute states that the move was necessitated by the number of information requests received from industrial firms and the general public since the organization was formed in July, 1957.

Circle **Item 89** on Inquiry Card

(Concluded on page 140)

SAFE OPERATION OF OVERHEAD VALVES
with a
Babbit
Adjustable
SPROCKET RIM
with Chain Guide



- Simplifies pipe layout
- Fits any size valve wheel
- Easy to install and operate
- Operates any valve from plant floor
- Time and money saving fixture
- No maintenance; first cost *only* cost
- Packed, completely assembled, one to a carton
- Hot galvanized, rust-proof chain available for all sizes
- Easy to follow instructions with each unit
- Your supplier carries complete stocks
- Write for new descriptive catalog sheet and prices

Babbit STEAM SPECIALTY CO.
5 BABBITT SQUARE, NEW BEDFORD, MASS., U.S.A.

New information for engineers about the lowest-cost air conditioning of all . . .

How CHRYSLER'S AIRTEMP controls

The 3 "Secret Costs" of Air Conditioning

"Secret Costs" can quickly amount to more than original cost...

But, when you specify AIRTEMP, you control "secret costs"

And you give your clients a brand they know—and trust.

No matter what kind or size of installation your plans call for, Chrysler AIRTEMP makes it . . . and you pay no more for it.

But the important fact is this: Chrysler AIRTEMP costs your client *far less* in the long run because it minimizes the 3 "secret costs" of air conditioning. And these may be more important than the first cost!

THE SECRET COST OF WRONG EQUIPMENT
The wrong equipment can be troublesome as well as costly to operate. Airtemp makes all kinds of air conditioners—over 297 models—and can advise you on which is best for your client's needs. You're sure to get exactly the right equipment from Airtemp!

THE SECRET COST OF OPERATION
Operating costs over a few years may actually exceed the first cost of air conditioning. But rock-bottom operating costs can save substantial sums. That's why you should know that AIRTEMP—thanks to Chrysler engineering—promises the lowest operating costs in the industry!

THE SECRET COST OF MAINTENANCE
Maintenance costs and repair costs can be a shock. A breakdown brings repair bills PLUS the cost of lost time, lost business. But Airtemp air conditioning is carefully engineered by Chrysler for trouble-proof operation. And Airtemp is installed only by qualified contractors, who must certify to Airtemp that equipment, warranted for 5 years, has been installed properly. That's why Airtemp maintenance costs average out to be the lowest in the industry!

May we give you the complete facts? For prompt action mail the coupon below. Or phone your nearest Airtemp contractor or dealer who is listed in the Yellow Pages.

CHRYSLER

Airtemp

AIRTEMP DIVISION, CHRYSLER CORP.
Dayton 1, Ohio
We would like the full facts on how Airtemp controls the 3 "secret costs" of air conditioning.

Name_____
Address_____
City_____ Zone____ State_____
Firm Name_____

NEW CATALOG AVAILABLE

MERCOID® CONTROLS

FOR INDOOR, OUTDOOR OR HAZARDOUS LOCATIONS

Write for your copy

CONTENTS:

Controls for—

- *PRESSURE*
  TWO-STAGE PRESSURE
  DIFFERENTIAL PRESSURE
- *TEMPERATURE*
  TWO-STAGE TEMPERATURE
- *LIQUID LEVEL*
- *MECHANICAL MOVEMENT*
  LEVER ARM AND
  FLOAT OPERATED
- *TRANSFORMER-RELAYS*
- *MERCURY SWITCHES*
  HERMETICALLY SEALED

ALL MERCOID CONTROLS INCORPORATE SEALED MERCURY CONTACTS

ASK FOR CATALOG NO. 858

THE MERCOID CORPORATION
4201 Belmont Ave., Chicago 41, Ill.

NEW CATALOGS

(Concluded from page 138)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

QUICK COUPLERS— Eight-page Catalog F-10-R gives complete information on Kamlok quick couplers manufactured by Jordan Industrial Sales Div., OPW Corp., Cincinnati, Ohio. Kamloks are used on hoses, piping, and equipment; a tight fit is made in seconds by sliding coupler halves together, then pressing cam arms. Catalog describes features, applications, materials, styles, and sizes of couplers, and contains dimensional drawings, pressure-temperature ratings, and useful chemical service recommendation chart.

Circle **Item 90** on Inquiry Card

AIR DIFFUSION EQUIPMENT—Consulting engineers, architects, and contractors will be interested in the 54-page catalog (No. 1-58) which describes and illustrates the complete line of grilles and registers manufactured by Waterloo Register Co., Inc., Waterloo, Iowa. Included are new products such as airline grilles and registers, curved louvers and grilles with louvers pivoted at the front. The catalog also contains selection tables for each of the 26 standard sizes and for the new grilles with curved louvers.

Circle **Item 91** on Inquiry Card

INDUSTRIAL DUST CONTROL— A 36-page catalog, entitled Industrial Dust Control, describes the complete line of dust filters manufactured by The W. W. Sly Manufacturing Co., Cleveland, Ohio, and gives detailed information about dust control systems and how to engineer them. The engineering section outlines a step-by-step procedure that can be followed in determining type and size of hooding, piping, and dust filter. Tables are provided to aid in determining these components to meet particular job requirements.

Circle **Item 92** on Inquiry Card

DESIGN OF PIPING SYSTEMS— Those concerned with the design, manufacture, testing, or installation of piping systems will be interested in a 48-page bulletin published by Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. Bulletin FB-77 summarizes and correlates various specifications of the ASA Code for Pressure Piping, and the ASME Boiler and Pressure Vessel Code. It is meant as an aid in computing the minimum safety requirements for the designing of a pressure piping system, and is available by written request on company letterhead.

installing

A SIMPLEX
RADIANT-ACOUSTICAL CEILING
complete integration for
• economy • comfort • efficiency

The environmental control "package" you have been looking for.

This ceiling does the complete job of heating, cooling and ventilating with one medium—air, while providing acoustical insulation, attractive concealment for overhead services and support for recessed lights.

Economy
– Smaller ducts and fans due to a ⅓ saving in air quantities.
– Permanent aluminum ceiling finishes.
– Air diffusers eliminated.
– Rapid, *one trade* installation.

Comfort
By using only air, SIMPLEX combines:
– the speed of response of forced air systems, with
– the superior comfort of radiant heating and cooling.

Saves Space
– Smaller ducts allow shallower plenum spaces. *Saves on building height.*
– All floor space is free for use by building occupant.

Also—no SIMPLEX radiant-acoustical ceiling has ever caused condensation!

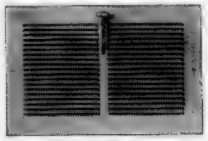
Send today for folder with complete specifications, photographs, and details. Simplex Ceiling Corp., 552 W. 52 St., New York 19, N.Y.

SIMPLEX
Ceiling Corp.
552 West 52 St., New York 19, N. Y.
Please send me folder describing the Simplex all air radiant-acoustical ceiling.
Name.....
Firm.....
Address.....
City.....Zone...State.....

sure signs of indoor comfort!

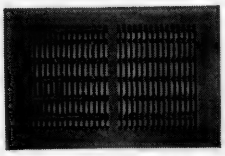
Standard Registers & Grilles

. . . for custom control of warm air heating



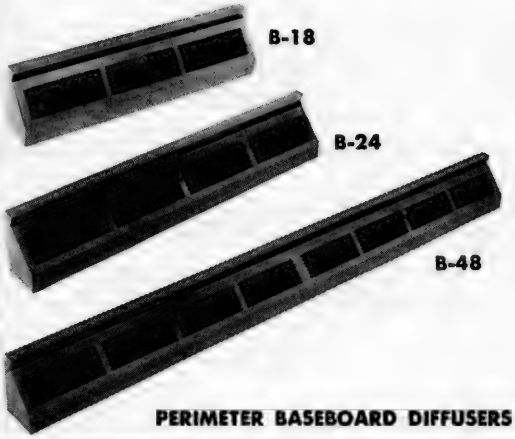
#41 H
WALL

SINGLE DAMPER FORCED AIR REGISTERS



#331
WALL

MULTIPLE VALVE SIDEWALL & BASEBOARD REGISTERS



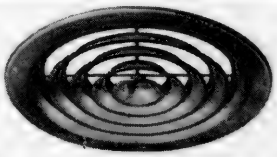
B-18

B-24

B-48

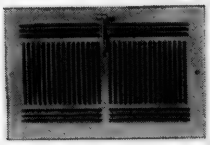
PERIMETER BASEBOARD DIFFUSERS

. . . for uniform, year-around heating and cooling comfort



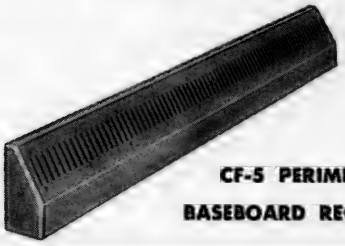
CEILING AIR DIFFUSERS (flush and extended)

PH SERIES PERIMETER FLOOR REGISTERS



#551
WALL

PERIMETER BASEBOARD REGISTER NO. 551



CF-5 PERIMETER BASEBOARD REGISTERS

Also: return air grilles, baseboard and sidewall intakes, air cond. and ventilating returns, door grilles, floor registers, cold air faces, frames, ornamental metals.

Install Standard Registers and Grilles on every job to save time and increase customer satisfaction.

STANDARD STAMPING

. . . first in engineering for indoor comfort!

Standard Stamping & Perforating Co.
3141 W. 49th Place, Chicago 32, Illinois

Gentlemen: Please send me your new catalog showing the complete line of Standard Stamping Registers and Grilles.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

ALL STANDARD D-H "PERMA-FAN"

DRAYER

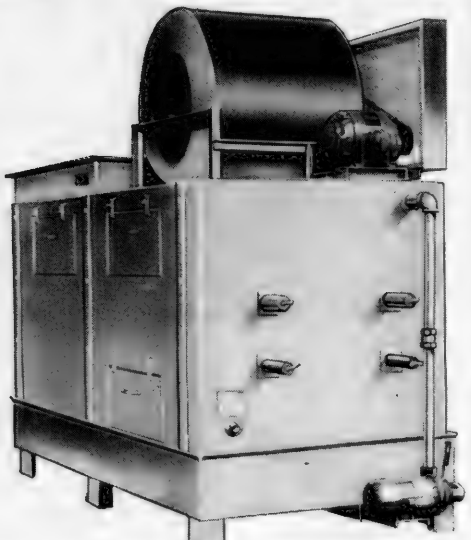
EVAPORATIVE CONDENSERS

HANSON

ARE HOT-DIP GALVANIZED

"PERMA-FAN"

AFTER FABRICATION!



A D-H EXCLUSIVE! FOR FREON 12; FREON 22; AMMONIA. THE D-H PIONEERED BLOW-THRU PRINCIPLE... NOT DRAW-THRU! PRIMARY COIL SURFACE COPPER TUBING. VOLUME DAMPER ADJUSTMENTS. PRICE? WAY DOWN, ON BEDROCK! 12 MORE FEATURES SHOWN IN OUR "PERMA-FAN" BULLETIN. MAY WE SEND YOU A COPY? WRITE:

d-h SINCE 1910

drayer-hanson

DIVISION OF NATIONAL-U.S. RADIATOR CORP

3301 MEDFORD STREET

LOS ANGELES 63, CALIFORNIA

CABLE: CLINCONI LOS ANGELES

MORE FACTS

on building technology asked by speakers at BRI-BRAB Institute. Cost reduction the objective.

Engineers, architects, builders, manufacturers, and construction industry economists, together Feb. 11-12 at a joint Building Research Advisory Board and Building Research Institute meeting, have outlined what they consider to be the chief problems of the building industry. All speakers strongly advocate development of accurate, dependable, scientific building design data through research, and better communication of technical progress between all branches of the industry.

Indicative of the tenor of the meeting is the statement of Chicago architect Norman Schlossman, who points out that scores of structurally sound buildings are demolished annually due to the workings of economics and obsolescence, and who asks what may be done to reduce the present imbalance between the life of the structure and the life of its equipment.

• **AIR-CONDITIONING**—The BRI-BRAB list of problems, approved for release at the meeting, is divided into industry segments. Problems of chief interest to architect, building contractor, plumbing contractor, etc., are detailed. The section on the air conditioning engineer lists six basic problems:

"1. The industry needs to investigate population densities in buildings of all types, prepare statistics on them and publicize the results. The basic assumption of number of people per sq ft in an air conditioned building often proves to be faulty, with the result that either too much or too little air conditioning is provided.

"2. More study and creative work should be devoted to shading devices as an integral part of building design to reduce heat gain from the sun and lower the cost of air conditioning.

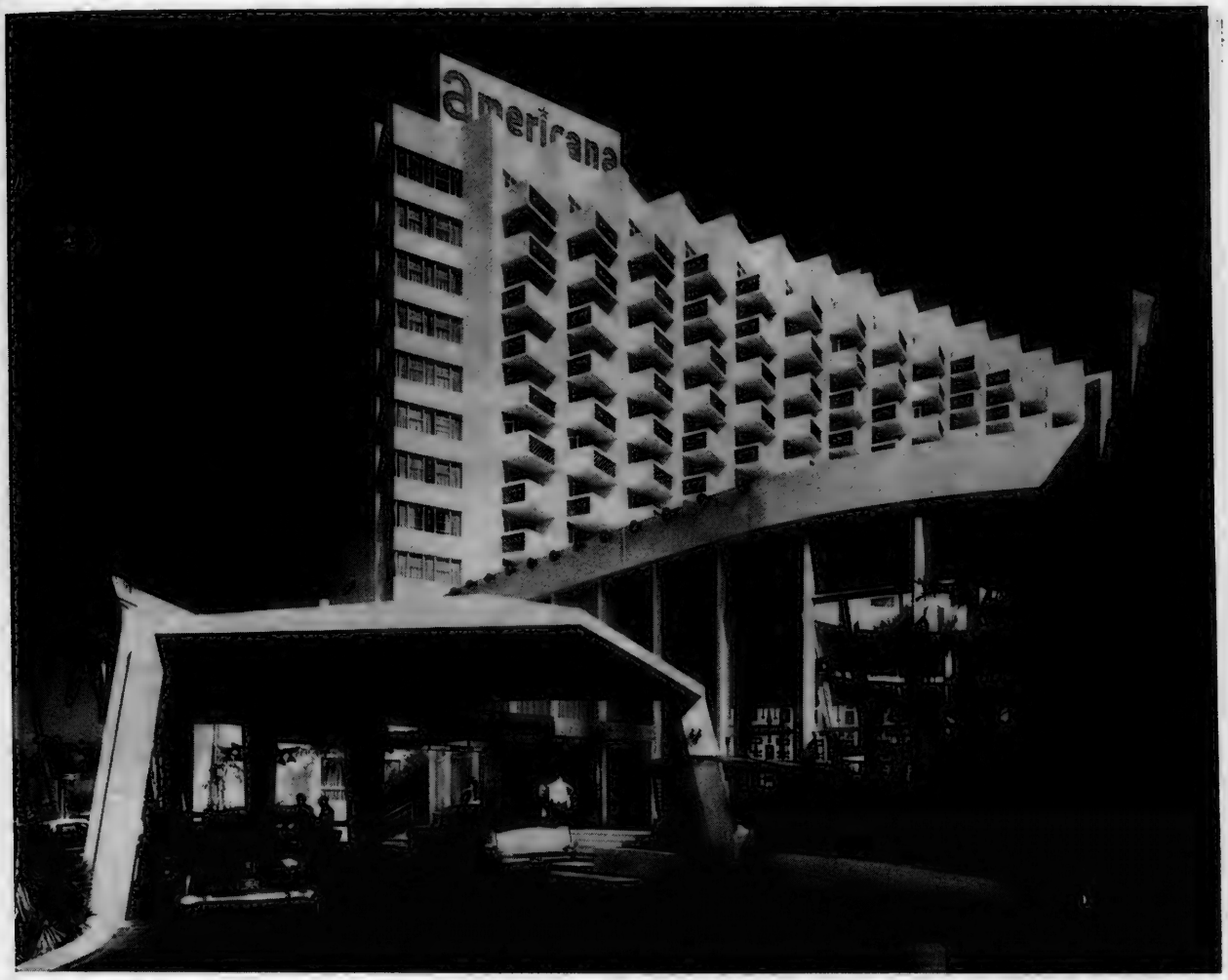
"3. We need to study the relative merits of different methods of insulating and vapor sealing, particularly in large roof areas, and the integration of insulation into the design of thin shell structures as used in new architectural forms.

"4. We need more data on the ultimate costs of various systems of construction—costs which include initial construction cost, interest, depreciation, amortization and the annual costs of operation and maintenance—to enable us to choose the best and cheapest method of construction in terms of the life of the building, whether it be 10, 15 or up to 25 years.

"5. We need research on acoustics as related to lighting, air conditioning and suspended ceilings, so that means may be devised to trap the sound above the ceiling.

"6. We need to study the effect of wind on the outside of a structure as it affects vents, air intakes, etc., and the deflection of wind by other structures adjacent to the proposed building which would influence its design and orientation."

(News of the Month continued on page 144)



Hotel Americana is owned and operated by Tisch Hotels, Inc., Morris Lapidus and Leo Kornblath, Designers and Architects; Taylor Construction Company, Miami, General Contractors; Markowitz Bros., Inc., Mechanical Contractors; George O'Mara, Mechanical Engineer. Boiler-burner units installed by Florida Fuel Oil Co., Miami. This luxurious hotel is located in the Bal Harbour section of Miami Beach, Florida.

Petro oil burners are chosen where only the finest can compete

What can a hotel achieve in luxurious living if its designers are allowed to apply the full resources of modern technology and art?

The answer can be found in the new Hotel Americana on the "Gold Coast" of Florida. This "Gateway to the Americas" can well be described as a small city of incredible beauty, graciousness and comfort. Its 475 spacious guest rooms and suites include 30 Lanai apartments, each with its own tropical garden, private entrance and patio. There is a whole series of fine restaurants and supper clubs, lounges and shops, and an Olympic-size pool surrounded by cabanas and recreation areas.

Petro-powered heating plant

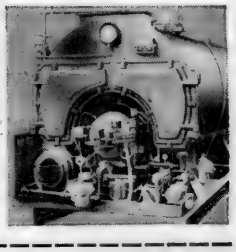
The enormous steam and hot water requirements of this lavish community are supplied by three boilers, fired by Petro rotary oil burners—chosen for their proved dependability. Petro burners are famed for their trouble-free firing of low cost heavy oils, and for their low maintenance costs. Models are also available for dual-fuel gas or oil firing.

For full information, please mail coupon.

Among the luxury hotels in the Miami area using Petro burners are:

- **Hotel Americana**
- **Hotel Fontainebleau**
- **Versailles**
- **Deauville**
- **Dupont Plaza**

Petro boiler-burner unit—a complete package, ready to go.



Includes Scotch boiler with forced draft firing system for oil, gas or gas-oil. Mounted on steel skids, with fuel, air and control systems installed and tested at factory. Requires little more than service connections.

PETRO

T.M. REG. U.S. PAT. OFF.

Makers of quality heating equipment for over 50 years

PETRO, 3226 West 106th Street, Cleveland 11, Ohio
(In Canada, write to 80 Ward Street, Toronto, Ontario)

Please send catalog and specifications on Petro gas and oil firing units.

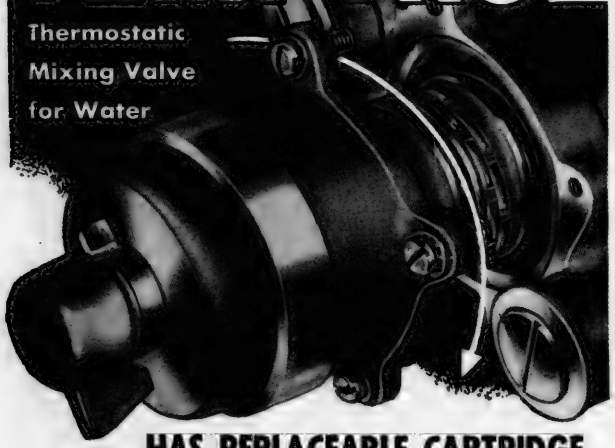
Name_____

Company_____

Address_____

City_____ Zone____ State_____

NEW FAIL-SAFE Symmons
TEMPTROL
Thermostatic Mixing Valve for Water



HAS REPLACEABLE CARTRIDGE

TEMPTROL – the new and only fail-safe thermostatic water mixer available with these outstanding features . . .

REPLACEABLE CARTRIDGE – which houses all working parts.

INSTANT SERVICE – Temptrol, with check stops, need never be removed from the line for costly servicing. A screwdriver to remove but four screws permits one to slip in new cartridge, if necessary—quickly—safely.

CONSTANT TEMP – hot water temperature is continuously and accurately maintained at all times.

ADJUSTMENT – temperature range from 90° all the way up to 180°.

AUTOMATIC – instant compensation for supply line temperature and pressure changes . . . safely shuts down on hot or cold failure.

INSTALLATION – can be installed at the heater as a Master Control, or anywhere along the line as a Zone Control.

CORROSION FREE – stainless steel control unit and electrolized sleeve assure extra long life and trouble-free performance.

ADDITIONAL PROTECTION – solid fill thermal element mounted out of the water in protected chamber open only to atmosphere.

AVAILABLE NOW – in four sizes: ¾", 1", 1¼" and 1½".

Truly a non-competitive item.

See SWEET'S ARCHITECTURAL FILE, DOMESTIC ENGINEERING CATALOG or write us direct for further information

Symmons ENGINEERING COMPANY
445 C STREET, BOSTON 10, MASSACHUSETTS

RESEARCH RESIDENCE

at University of Illinois will be typical of contemporary residence to enable study of warm air heating.

Plans are announced for a new Warm Air Research Residence, the fourth to be erected at the campus of the University of Illinois by the National Warm Air Heating and Air Conditioning Association.

Typical of today's larger home, the residence will have 8 rooms, 2½ baths, four bedrooms, and 2000 sq ft of usable space on two levels. Research equipment will provide for temperature information from 400 points inside

and outside the house, within the walls, floors and from units of the heating system.

• **STUDY AIR MOVEMENT**—Internal movement of air between floors of a split level home is one of the things the engineers will study, according to Prof. Donald R. Bahnfleth, in charge of warm air heating research at Illinois. Other factors will be seasonal load variations on each level and heating of rooms over a garage.

Two heating systems will be built in, one with warm air perimeter outlets, the other with high sidewall or ceiling outlets, and two air return systems, one having only one grill at each level, other with a return duct from each room.

By blocking off portions of the house, it can be used for studies of one-level, two-level, or split-level homes, and of heating with a slab direct on the ground, crawl space or basement.

SPECIAL SUMMER COURSES

in heat transfer and thermodynamics offered by Massachusetts Institute of Technology for engineers.

During its 1958 Summer Session, Massachusetts Institute of Technology will offer two courses for engineers, research workers, and teachers, in its two-week Special Summer Program, of special interest to our industry.

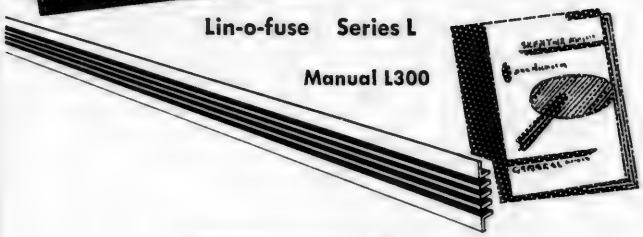
• **HEAT TRANSFER**—"Modern Developments in Heat Transfer", which runs from Tuesday, July 8, through Friday, July 18, consists of a series of lectures on the following topics: Radiation; Interrelations between the transfer of mass, heat, and momentum; Heat transfer with change of phase (boiling and condensation); Heat transfer to fluids flowing at high velocities; Dynamic

(News of the Month continued on page 146)

Announcing

An Expanded Range Of
*AIR DISTRIBUTION EQUIPMENT
by
GENERAL AIR PRODUCTS CORP.

R.S.V.P.

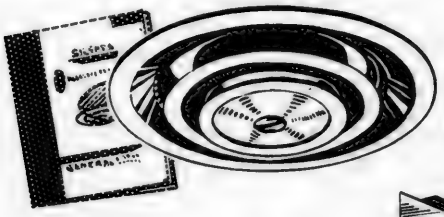


Lin-o-fuse Series L

Manual L300

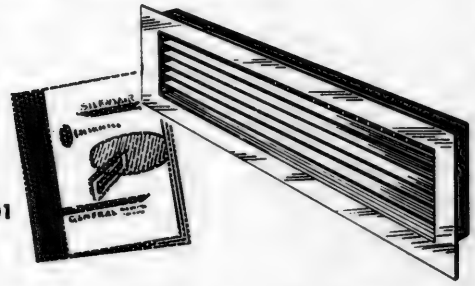
Series S
Square
Rectangular
Continuous

Manual S-400



Circular Series C

Application Manual C-100



Registers
Grilles

Manual G-201

A complete line of *Quality* diffusers and grilles, designed to please the most discriminating Architect and the most meticulous Engineer are offered, to meet your requirements.

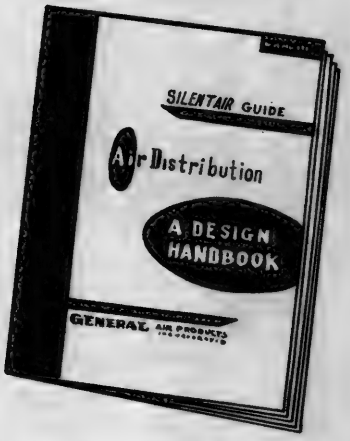
*Including GENERAL Registers and Grilles

Don't be general... be specific
***specify GENERAL* AIR PRODUCTS**

AVAILABLE...*

a new tool for the professional . . . useful design information for

- **ARCHITECTS**
- **ENGINEERS**
- **CONTRACTORS**



Silentair Manual E900

A unified treatment of modern air distribution for new and existing buildings . . . from inception of building to final installation of system . . . a guide in the selection of the air diffuser type, best suited to your needs.

***Available May 1, 1958**

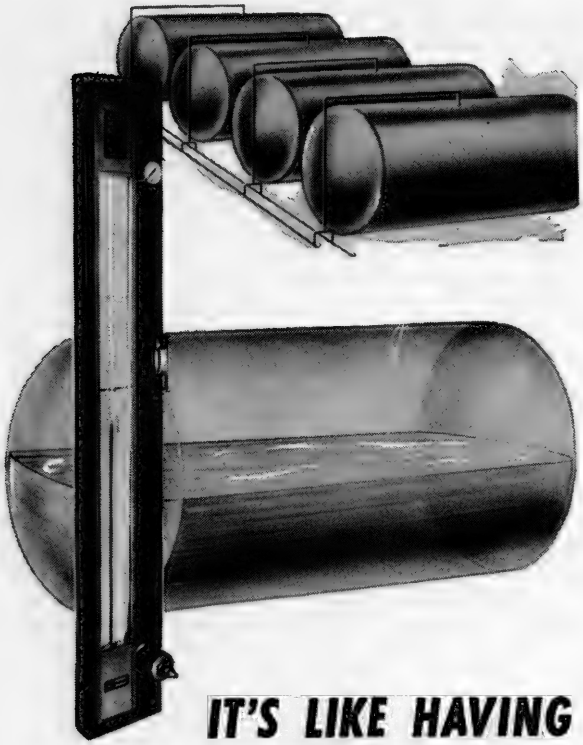
Order Your Copy Now!

A request for literature or information, on your letterhead, will receive prompt and courteous attention. Write to..

GENERAL
AIR PRODUCTS CORP.
14 FACTORY STREET
CEDAR GROVE, NEW JERSEY

or your local

SILENTAIR
REPRESENTATIVE



IT'S LIKE HAVING TRANSPARENT TANKS

When you use

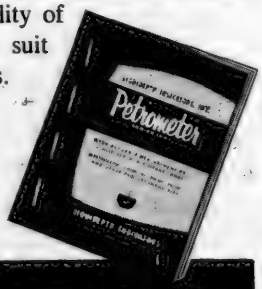
PETROMETER

REMOTE READING

LIQUID DEPTH INDICATORS

You can read the Petrometer Liquid Depth Indicator with as much confidence as if you were looking directly into your tank. It's accurate and reliable . . . operates on the principle of hydrostatic pressure.

Unique construction of Petrometer indicators makes installation easy . . . and unitized design of all working parts permits wide flexibility of multi-gauge panel design to suit your installation requirements.



Complete information is available in our Bulletin 6400. Send today for your copy.

PETROMETER CORP.

43-22 TENTH ST.

LONG ISLAND CITY 1, N.Y.

response of heat exchangers; Two-phase pressure drop; Solutions by finite difference methods; and Thermal stresses.

• **THERMO COURSE**—"Thermodynamics for Engineers and Chemists", which runs from Monday, June 23, through Thursday, July 3, is described as follows:

"The principles of classical thermodynamics for the macroscopic examination of equilibrium states and the principles of statistical mechanics for the microscopic examination of systems will be presented first. The main emphasis will then turn toward the study of non-equilibrium states and irreversible processes with particular attention to the coupling of fluxes of heat, matter, and electricity. Program members will study modern applications of classical thermodynamics, statistical mechanics, and the thermodynamics of irreversible processes as they relate to paramagnetic substances, electrochemistry, electronic phenomena, the third law, heat of transport, and thermoelectricity." Tuition for each course is $250.

TEXAS ASHAE

will be host to 66th annual meeting of the national society, February 1960, held with Southwest Show.

The 66th Annual Meeting of the American Society of Heating and Air-Conditioning Engineers and the 2nd Southwest Heating and Air-Conditioning Exposition, sponsored by ASHAE, will be held in Dallas, Tex., February 1-4, 1960.

Registration and meeting headquarters will be the Baker and Adolphus hotels and the exposition will be in the new Memorial Auditorium, four blocks away.

C. Rollins Gardner, Ft. Worth, is the general chairman of the Committee on Arrangements, selected by the North Texas Chapter; host for the meeting.

Headquarters hotel for exhibitors will be at the Statler Hotel which is readily accessible to the Memorial Auditorium. The International Exposition Co., New York, N. Y., is manager of the Exposition.

GAS TO OUTLAST OIL

as natural resource of the United States, according to reports presented at Petroleum Engineers meeting.

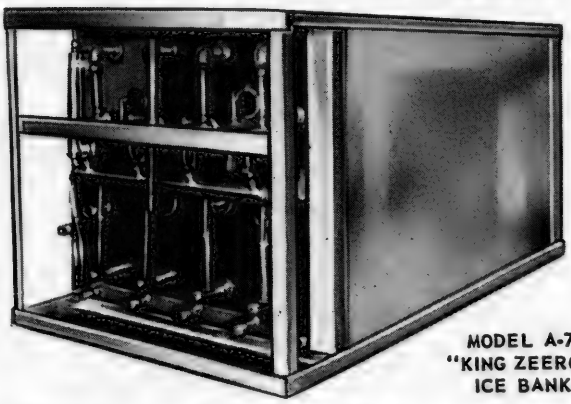
The nation's oil production will reach its peak in about nine years, while peak production of natural gas will not occur for twenty-five years, according to experts at the annual meeting of the Mining, Metallurgical, and Petroleum Engineers.

Petroleum reserves, in barrels per foot of drilling, have been steadily declining over the past nine years, a well established trend, says Warren B. Davis, Gulf Oil Company. He predicts a rise in crude oil prices eventually to four dollars a barrel. Ralph O. Rhoades, senior vice-president of the company, warned that elimination of oil imports would inflict incalculable damage to the nation,

(News of the Month concluded on page 148)

Add a "King Zeero" ICE BANK to Your Refrigerating System for Effectual, Economical Air Conditioning

The "King Zeero" ICE BANK is designed to deliver 32° to 34°F. ice water for recirculation through air cooling coils in exactly the right amount when and where it is needed. It levels off "peak" and "valley" loads. Peak loads many times compressor capacity are easily handled. Ice Banks may be added to increase existing capacity. Refrigerant: Freon, Methyl Chloride or Ammonia.



MODEL A-7
"KING ZEERO"
ICE BANK

CAPACITIES - 500 lbs. to 30,000 lbs. (72,000 B.T.U.'s to 4,320,000 B.T.U.'s) in a single unit. Multiple units may be installed.

The Patented Coils with Built-in Louvres opposed to the flow of water through the ICE BANK provide turbulence. This eliminates a mechanical agitator - insures all the water rubbing all of the ice. No upkeep or repair expense whatever.

The "King Zeero" Ice Storage System of water chilling has definite advantages over direct expansion, or other types of ice accumulators.

Saves power through smaller compressor requirement. Simple construction (no moving parts). Dependable in performance. Low operating and costs.

Let the ice stored during light loads take care of peak loads. The compressor need only handle the average daily load - not the peak.

THE KING ZEERO COMPANY
4300-14 W. Montrose Ave. - Chicago 41, Ill.
Manufacturers of Ice Builders - Ice Builder Cabinets - Ice Banks

LOW INSTALLATION
AND MAINTENANCE COSTS
. . . plus added years
of dependable service

•

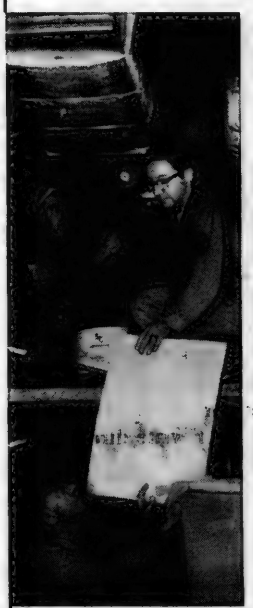
TODD BURNERS
GAS OR OIL

•

PRODUCTS DIVISION
TODD SHIPYARDS CORPORATION
Headquarters:
Columbia and Halleck Streets,
Brooklyn 31, N. Y.
Plant:
Green's Bayou, Houston 15, Texas

TODD NEW YORK, U.S.A.

Bond Insulation PERMANENTLY with ST. CLAIR



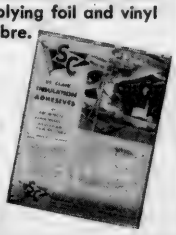
Specially Formulated Insulation Adhesives

ST. CLAIR Insulation Adhesives provide excellent coverage, high heat resistance and easier handling of insulation which can be bonded immediately or up to 45 minutes after applying adhesive.

These insulation adhesives afford fine results for bonding insulation to ducts. They supersede pins and clips, wires, screws, and caps, because they save on installation cost while providing a better, neater and more permanent bond.

ST. CLAIR also produces clear and white adhesives for bonding lap seams on pipe insulation—also other adhesives for applying foil and vinyl facings to glass fibre.

Send for Free Sample & Catalog



ST. CLAIR RUBBER CO.
440-C E. JEFFERSON AVE. • DETROIT 26, MICH.

when you choose roof ventilation equipment,

CHOOSE THE SYMBOLS THAT MEAN DEPENDABILITY..

PENN VENTILATOR

Penn is proud to feature the AMCA symbol . . it's your assurance that Penn Ventilators have met the rigid standards of quality performance in accordance with our published ratings.

specified recently for: Dormitory Buildings, University of Mississippi, Oxford, Miss.

PENN DOMEX

. . features . . Skyline Stylishness . . High Performance . . and durable, bright aluminum housings. Domex Ventilators' recent development is the "Significant Scroll", a deep, one-piece spun inlet — exclusive with Penn RB and QB series — providing *proper design*, quiet operation and certified capacities.

Detailed information and literature is available from your local representative . . or write direct.

PENN VENTILATOR CO., INC.
PHILADELPHIA 40, PA.

Representatives and Distributors in Principal Cities
Member of the Air Moving and Conditioning Assoc.

because the country's reserve position, calculated on current consumption rates, will carry us for no more than 11.3 years.

Lyon F. Terry, vice-president of Chase Manhattan Bank, estimates our total future gas supply at 1,200 trillion cubic feet. All-time peak of production of about 20,000 million cu ft per year will come about by 1980-90, he says.

COLOR CODE

for pneumatic tubing on instrument panels adopted by the Instrument Society for quick identification.

A color code for panel tubing has been established by experts under the supervision of the Instrument Society of America, Pittsburgh, Pa.

This set of standards is the twenty-second of the so-called Recommended Practices regularly put out by ISA. Like the others it specifies uniformity in a certain segment of design, manufacture, or application of control instruments.

ISA recommends uniform color coding of pneumatic tubing on instrument panels in this four-page study. In essence the code urged for industry-wide adoption is this: air supply—*red*, seal—*purple*, set—*black*, alarm—*green*, readout—*blue*, transmitted—*orange*, controlled—*yellow*, all others—*natural*.

A need for standardization of colors in instrument panel work has been apparent for years, the Society states. A survey conducted by ISA revealed that color coding was in wide use, but that there was no uniformity in selecting a given color for a given service. The new set of approved standards will permit quick identification of tubing circuits throughout industry.

Canadian Degree-Days for February, 1958*

City	February		Cumulative	
	1958	Normal	1957-58	Normal
Calgary, Alta.	1460	1350	6119	6540
Charlottetown, P. E. I.	1189	1370	4889	5680
Crescent Valley, B. C.	867	1080	5055	5660
Edmonton, Alta.	1581	1520	6712	7370
Fort William, Ont.	1580	1580	6973	7370
Grande Prairie, Alta.	1708	1600	7426	7720
Halifax, N. S.	1050	1180	4151	4955
London, Ont.	1311	1210	5192	5210
Medicine Hat, Alta.	1472	1380	5792	6380
Moncton, N. B.	1275	1380	5214	6000
Montreal, P. Q.	1469	1430	5506	6060
North Bay, Ont.	1577	1530	6528	6860
Ottawa, Ont.	1503	1450	5775	6300
Penticton, B. C.	731	960	4127	4740
Prince George, B. C.	1282	1320	5889	6650
Quebec City, P. Q.	1470	1510	6024	6660
Regina, Sask.	1632	1680	7143	7770
St. John, N. B.	1281	1310	5107	5880
Saskatoon, Sask.	1704	1710	7304	7950
Timmins, Ont.	1767	1680	7468	7870
Toronto, Ont.	1231	1147	4718	4918
Vancouver, B. C.	554	740	3250	3750
Victoria, B. C.	540	660	3081	3430
Windsor, Ont.	1190	1100	4673	4760
Winnipeg, Man.	1653	1714	7176	7737

* These data are supplied through the courtesy of the Meteorological Division, Air Service Branch, Department of Transport, Canada.

more profits for you!

INSTALL LOWER COST BRADLEY SHOWERS

• Where shower stall separations are not essential, the *Bradley Column Shower* offers the lowest cost bathing facilities. *One* Column provides for *five* bathers, each with control of water supply and temperature. They are used in schools, camps, recreation centers, institutions, factories, etc., etc.

Bradleys can help you get more shower bath business. Write for specifications and installation data, Catalog 5601 . . . BRADLEY WASHFOUNTAIN CO., 2352 W. Michigan St., Milwaukee 1, Wis.

BRADLEY *multi-stall showers*

Distributed Through Plumbing Wholesalers

GEM REFRACTORIES SINCE 1907

Combustion Chambers

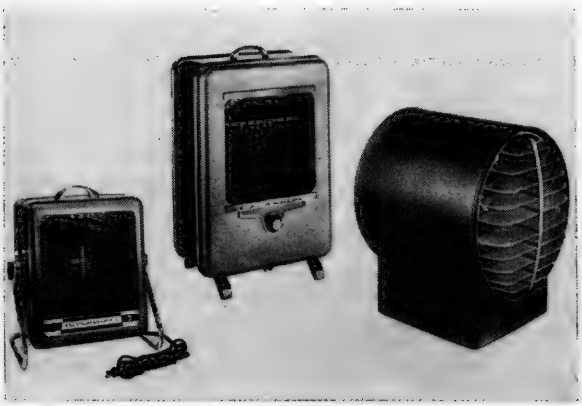
The experience and engineering know-how of more than fifty years offers built-in assurance of quality in every GEM CLAY Combustion Chamber

Special shapes to meet your individual requirements and specifications are our specialty.

GEM production facilities are among the most complete in the field of engineered refractories. That's why GEM is a by-word for fast, prompt deliveries.

WRITE TODAY for cost-saving FREE estimates.
Send inquiries to: Engineering Department.

GEM CLAY FORMING, Inc.
Box 500 • SEBRING, OHIO
RADIANTS • BACKWALLS • INSULATING BRICK
STOVE LINERS • HEATING ELEMENTS



Dependable, low-cost space heating where and when you need it

CHROMALOX Electric COMFORT HEATERS

You have a choice of blower, convection or radiant types of heating, all with Chromalox totally enclosed heating elements. Portable, mounted or built-in units—¼ to 40 kw. Automatic or manual controls.

Sizes and types for heating any size space—from a small spot or room to an entire building. Easy and economical to install and maintain.

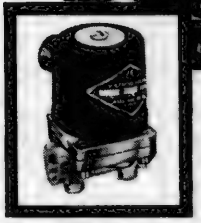
Write for your copy of quick selector Catalog D-52 to get complete information on Chromalox Electric Comfort Heaters and their applications.

For information on the complete line of Chromalox Electric Heaters request Catalog 50.

Let the Chromalox Sales Engineering staff solve your heating problems . . . electrically

Edwin L. Wiegand Company
7588 Thomas Boulevard, Pittsburgh 8, Pennsylvania A-4471

In the fabulous Americana Hotel, Miami Beach



J-E SOLENOID VALVES

Quietly **and** ***Dependably*** **Control the Personalized Air Conditioning in 475 Guest Rooms**

Owned and operated by Tisch Hotels, Inc., the Americana has individually-controlled air conditioning, for heating or cooling, in every guest suite. To assure quiet, dependable, personalized control of room temperatures, the air conditioning contractor (Hill York Sales Corp.) selected Jackes-Evans Solenoid Valves.

For complete satisfaction on *your* jobs also, *specify* J-E Valves. Call your wholesaler or write direct today.

Controls Division
JACKES-EVANS MANUFACTURING COMPANY
4427 Geraldine Ave. • St. Louis 15, Mo.

AGITAIR®

Custom Made

SQUARE and RECTANGULAR

AIR DIFFUSERS

Custom made in unlimited air patterns, AGITAIR square and rectangular air diffusers suit all job conditions . . . blend perfectly with any interior design.

These AGITAIR diffusers need not be centrally located. They assure draftless, noiseless, equalized air distribution from any location in the ceiling or side wall.

Write for Catalog R107 for complete data.

THERMOTANK — AGITAIR

high velocity units • punkah louvers
air diffusers • filters • exhausters

Sold exclusively by representatives for:

AIR DEVICES INC.

185 MADISON AVENUE, NEW YORK 16, N. Y.

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

WELDING SHOW—Annual welding show, American Welding Society, Kiel Auditorium, St. Louis, Mo. For information write AWS Welding Show, 12 E. 41 St., New York 17, N. Y. **APRIL 15-17, 1958.**

BRI MEETING—Seventh annual meeting of the Building Research Institute, at the Shoreham Hotel, Washington, D. C. C. R. Koehler, Publicity, BRI, 2101 Constitution Ave., Washington 25, D. C. ..... **APRIL 21-23, 1958.**

AIHA CONVENTION—19th annual meeting of the American Industrial Hygiene Association at the Claridge Hotel, Atlantic City, N. J. G. D. Clayton, executive secretary, 14125 Prevost, Detroit 27, Mich. ..... **APRIL 21-26, 1958.**

AIR-CONDITIONING AND REFRIGERATION MEETING—Annual meeting of the Air-Conditioning and Refrigeration Institute, at The Homestead, Hot Springs, Va. Secretary of the Institute, 1346 Connecticut Ave., N.W., Washington 6, D. C. ..... **MAY 4-7, 1958.**

LPGA CONVENTION—27th annual convention and trade show of the Liquefied Petroleum Gas Association, at the Conrad Hilton Hotel, Chocago, Ill. Secretary of the Association, 11 S. LaSalle St., Chicago 3, Ill. ..... **MAY 4-7, 1958.**

OIL HEAT MEETING—Oil Heat Institute of New England, Hotel Sheraton-Plaza, Boston, Mass. Ivan C. Sutherland, director, 839 Beacon St., Boston 15, Mass. ..... **MAY 7, 1958.**

AIR CONDITIONING SHOW AND MEETING—Western Air Conditioning Industries Association, conference and exhibit, Shrine Exposition Hall, Los Angeles, Calif. E. J. Tavery, 3443 S. Hill St., Los Angeles 7, Calif. ..... **MAY 7-11, 1958.**

WORLD TRADE FAIR—1958 United States World Trade Fair to be held at the New York Coliseum, New York, N. Y. D. J. Jacobson, United Public Relations, Inc., 120 E. 56th St., New York 22, N. Y. ..... **MAY 7-17, 1958.**

MECHANICAL CONTRACTORS CONVENTION—69th annual Convention of the Mechanical Contractors Association of America, Inc., at the Ambassauor Hotel, Los Angeles, Calif. L. B. Gruman, executive secretary of the Association, Suite 570, 45 Rockefeller Plaza, New York 20, N. Y. ..... **MAY 20-23, 1958.**

INDUSTRIAL RESEARCH CONFERENCE—Ninth annual Industrial Research Conference at Arden House, Columbia University, New York, N. Y. R. T. Livingston, director, Columbia University, 409 Engineering Building, New York 27, N. Y. ..... **JUNE 1-6, 1958.**

NDHA CONVENTION—49th annual meeting of the National District Heating Association, at the French Lick-Sheraton, French Lick, Inc., J. F. Collins, Jr., secretary of the Association, 827 N. Euclid Ave., Pittsburgh 6, Pa. ..... **JUNE 2-6, 1958.**

OIL HEAT EXPOSITION—2nd Oil Heat and Air Conditioning Exposition at the New York Coliseum, New York. C. H. Pesterfield, secretary, Oil Heat Institute of America, Inc., 500 Fifth Ave., New York 36, N. Y. ..... **JUNE 9-12, 1958.**

ASTM MEETING—Annual meeting of the American Society for Testing Materials, at the Hotel Statler, Boston, Mass. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. . . **JUNE 22-27, 1958.**

JOINT ASHAE-ASRE MEETING—Joint summer meeting, American Society of Heating and Air-Conditioning Engineers and American Society of Refrigerating Engineers. Hotel Leamington, Minneapolis, Minn. A. V. Hutchinson, secretary of the ASHAE, 62 Worth St., New York 13, N. Y., and Secretary of the ASRE, 234 Fifth Ave., New York 1, N. Y. ..... **JUNE 23-25, 1958.**

REFRIGERATION WHOLESALERS MEETING—Annual meeting of the Air-Conditioning and Refrigeration Wholesalers, at the Sheraton-Palace Hotel, San Francisco, Calif. Secretary of the Institute, 2607 N. High St., Columbus, Ohio. ..... **OCTOBER 22-24, 1958.**

EXPOSITION AND ASHAE CONVENTION—65th annual meeting, American Society of Heating and Air-Conditioning Engineers (Jan. 26-29, 1959) and 14th International Heating and Air Conditioning Exposition, Philadelphia, Pa. A. V. Hutchinson, secretary of the Society, 62 Worth St., New York 13, N. Y. . . **JANUARY 26-30, 1959.**

ARI EXPOSITION—11th Exposition of the Air-Conditioning and Refrigeration Industry at Convention Hall, Atlantic City, N. J. Geo. S. Jones, Jr., managing director of Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. ..... **NOVEMBER 2-5, 1959.**

√Take your choice!

ELLISON AIR FILTER GAGES IN 3 TYPES

Ellison Air Filter Gages are high precision instruments —not dime store gadgets. Built for a lifetime of dependable service. Widely used in public buildings, hotel, hospital and office buildings. Three types offered:

Inclined Tube Type

Accurately indicates air flow resistance in duct at air filter. Easy-read white enamel scale. Level and tube replaceable on the job. Easily installed.

Diafram Actuated, Dial Type

High powered, free floating diafram. Accurate pointer mechanism floats on knift-edge bearings. Easy to read—readily installed.

Bell Actuated, Dial Type

Bell submersed in oil pan actuates the accurate mechanism which floats on knife-edge bearings. Bell oil easily replenished through inlet at top.

● *Ask for Air Filter Gage Bulletin 214.*

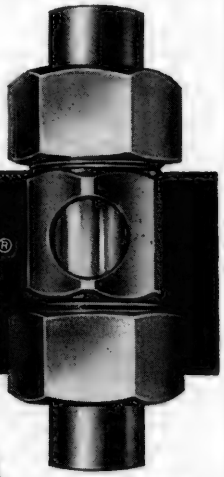
ELLISON DRAFT GAGE CO., INC.

542 W. MONROE ST. Since 1896 CHICAGO 6, ILL.

The Ellison Line Also Includes:

Draft Gages, Bell and Diafram—Inclined Draft Gages—Portable Inclined Vertical Tube Gages—Vertical Tube Gages—Oil, Heavy Liquid and Mercury—Single and Multi-Tube-Saturator Gages—U Gages—Stationary and Portable—Air Filter Gages—Dial and Inclined Tube Types—Pitot Tubes—U Path Steam Calorimeters—Portable Gas Analyzers-Orsat Type

PROVED ON THOUSANDS OF PRODUCTION LINE INSTALLATIONS!



"250" SERIES

LIQUID EYE®

POSITIVE SEALING INDICATORS

designed to save you even more time and money.

DESIGN FEATURE

extension-gasket . . . ALL ONE-PIECE!

A built-in gasket that's always in place for positive sealing and foolproof assembly.

6 sizes now available: ⅜", ½", ⅝", ⅞", 1⅛" and 1⅜" O.D.S.

The "250" has all the proved Liquid Eye advantages *plus* these newly engineered features:

- **smaller—more compact, simplified design.**
- **preformed copper extension eliminates need for separate gaskets—*foolproof* installation.**
- **complete, self-contained, economy unit.**

Write today for catalog E-57 covering the complete Allin line.

Allin

ALLIN MANUFACTURING CO.

410 N. Hermitage Ave. • Chicago 22, Illinois

Over 1,000,000 Liquid Eyes Sold to Date!

FOR LOW COST HEATING PLANT POWER-DRAFT AND INDUSTRIAL EXHAUSTING

Patent No. 2,722,372. Other Patents Pending.

...Specify Quickdraft

★ NO MOTORS, FANS OR BEARINGS IN EXHAUST LINE ★ NEEDS NO STACKS ★ ACID RESISTING FINISHES ★ STATIC PRESSURE UP TO 20 INCHES

FOR HEATING PLANTS AND INCINERATORS, Quickdraft provides constant draft for efficient and economical combustion. It eliminates pulsating or chattering, puffing, smoking and sooting. Costly, tall and unsightly stacks are unnecessary.

FOR INDUSTRY, Quickdraft offers up to 20 inches static pressure for **exhausting** corrosive gases, abrasives and paint spray . . . **moving** fine bulk materials and wastes.

FOR MOVING AIR . . . in or out of building through ducts . . . Quickdraft is outstanding.

N-589-QD

IMPORTANT NOTICE

For withstanding corrosive gases, all Quickdraft units are available in standard acid resisting vitreous enamel, No. 316 Stainless Steel, rigid plastics (P.V.C.) and with plastic and Fiberglas coatings.

Write for QUICKDRAFT ENGINEERING DATA on your application . . . today.

Quickdraft CORPORATION P. O. Box 87--O Canton 1, Ohio

Have You
You Can

You will find your questions answered quickly, simply and correctly with these useful books on heating, ventilating, air conditioning, piping, plumbing and related subjects. Each book contains valuable information that you can have within your reach by mailing the convenient coupon at the bottom of the next page.

DESIGN OF HEATING AND VENTILATING SYSTEMS

Includes 96 full-page charts to solve your heating and ventilating problems involving load determination, duct design, panel heating, solar heating and combustion analysis. Opposite each chart is a design example and the solution illustrating the use of each method. The text clearly explains the engineering background and the mathematical basis of each chart.

320 Pages, 96 Charts, **$7.00**

In Canada or overseas, $7.80

EXHAUST HOODS

Practical hood design including the latest principles of air handling, contaminant dilution and transport velocities. Includes design of hoods for control of dust, mist, fumes, vapors and gases with many particular references to processes such as bagging, drilling, screening, grinding, welding, plating and many others. Simple formulas and diagrams show exact procedures.

130 Pages, 127 Illustrations, **$3.50**

In Canada or overseas, $4.20

FLOW AND FAN

The flow of gas through ducts, and fan performance and control are authoritatively covered in this useful work. Covers principles of moving air through ducts, including elements of fan selection and control, duct arrangement, system characteristics and flow analysis. Gives basic data and describes methods used to calculate system resistance, plus practical information that will help in selecting a fan for a given duty.

232 Pages, 84 Illustrations, **$4.00**

In Canada or overseas, $4.70

DESIGN OF INDUSTRIAL EXHAUST SYSTEMS

How to design, build or buy an exhaust system that will function adequately and economically, and meet the requirements of law and industrial hygiene. Covers flow of fluids—hood forms—air flow through hoods—pipe resistance—piping design—dust separators—low pressure conveyors—centrifugal exhaust fans—structural details—field measurements and their interpretation.

252 Pages, 122 Illustrations, **$3.50**

In Canada or overseas, $4.25

PIPEFITTERS HANDBOOK

Original tables, based on pipefitter's practical experience. Designed to provide quick, direct answers to problems of pipe bending, mitering, layout, threading, etc., either in the shop or in the field. Convenient pocket size, flexible Fabrikoid binding.

282 pages, **$6.00**

In Canada or overseas, $6.65

the Facts That You Need At Your Fingertips? Solve Your Problems With These Valuable Books

RADIANT HEATING—2nd Edition

The basic principles, the experienced-proved facts, the practical working data on applications of radiant energy for heating and cooling. Facts and figures can be applied directly in designing and installing radiant heating systems. Easy-to-use charts give most of the design data without calculation.

504 Pages, 337 Illustrations, **$6.00**

In Canada or overseas, $6.90

FLUID FLOW IN PIPES

How to solve problems involving the flow of liquids and gases through pipes. Shows how to handle viscosity, friction, head, and other factors expressed in various dimensional systems. Applications of the principles to problems in piping are presented with worked-out examples.

124 Pages, 18 Illustrations, **$3.00**

In Canada or overseas, $3.70

METHODS OF JOINING PIPE

In no other book will you find so much detailed information on standard and special joints for all types of metallic, glass, tile, plastic and concrete pipe. Also included are data on joints designed to take up movement due to expansion and contraction. Written by a mechanical engineer with many years' experience.

236 Pages, 249 Illustrations, **$3.00**

In Canada or overseas, $3.75

FUEL OIL MANUAL—Revised 2nd Edition

Covers characteristics and uses of every type and grade of fuel oil. Explains the meaning of each oil property, and shows how this information is applied in selecting, handling and burning fuel oil. A special chapter covers fuel oil additives and how they are used, and another covers troubles encountered in using fuel oil and shows correct remedies. 176 Pages, 34 Tables, **$4.50**

In Canada or overseas, $5.20

SNOW MELTING

A valuable handbook of correct, tested practice that covers the steps in planning, designing, building and operating snow melting systems of all sizes and types. Time-saving charts, tables and graphs give all the necessary data and simplify every step from preliminary planning to final operations.

224 Pages, 189 Illustrations, **$4.50**

In Canada or overseas, $5.25

PLANT AND PROCESS VENTILATION

Contains design factors and data that can be applied to any situation. Principles are clearly set forth and lead logically to rules of procedures. By the simple observation of a process you can now estimate accurately the exhaust requirements of any cold, multi-directional process; and, with the necessary field data, refer to tables which summarize exhaust requirements for such a situation.

448 Pages, 172 Illustrations, **$9.00**

In Canada or overseas, $10.00

ELECTRICAL TESTING AND TROUBLESHOOTING

Simple, straightforward field tested procedures for locating obscure sources of electrical trouble. The book is so clear that it is useful as a training text, as well as a working manual for practicing electricians and others concerned with use and maintenance of electrical equipment. Most of the tests are performed with equipment isolated from the power line—making them safe for personnel.

200 Pages, 100 Illustrations, **$4.00**

In Canada or overseas, $4.70

INDUSTRIAL HEAT TRANSFER

A combined text and reference book that provides 123 time-saving working graphs for the direct solution of most commonly encountered problems. Use of these graphs, which are equal in accuracy to the equations from which they are derived, helps to eliminate errors in calculation.

336 Pages, 136 Charts and Illustrations, **$6.00**

In Canada or overseas, $6.80

MAIL THIS CONVENIENT ORDER FORM

The Industrial Press, 93 Worth St., New York 13, N. Y.

Please send me the books listed below, under the terms checked at the right.

.....

.....

.....

Name .....

Company .....

Street & No. .....

City ..... Zone ..... State .....

HV/4/58

CHOOSE YOUR MOST CONVENIENT METHOD OF PAYMENT

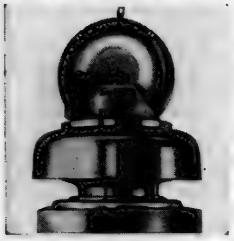
☐ I enclose check or money order covering payment in full. (Note prices applying to foreign orders.) Send books postpaid.

☐ Send books under Five-Day Free Inspection Plan. If I decide to keep books I will send payment, plus postage charges, within five days.

☐ Bill me ☐ Bill company

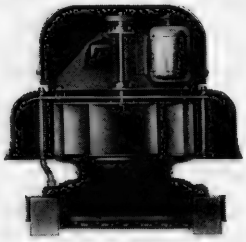
☐ Send details of your Time Payment Plan covering the books indicated.

Uniform appearance
All-aluminum construction, in COOK *belt and direct drive models*



Belt Drive Centrifugal Model CB, Capacities to 13,939 cfm

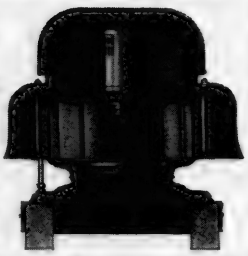
Even Drive Assembly Is All-Aluminum No Steel.



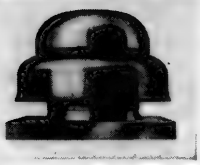
Only 39" high in largest size. Adjustable sheaves give wide choice of tip speeds and cfm. Light starting torque with all-aluminum blower wheel. 13,939 cfm size weighs only 280 lb.

Direct drive Centrifugal Model CD, Capacities to 10,263 cfm

Ample air supply to motor chamber.

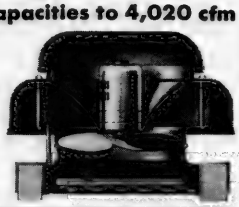


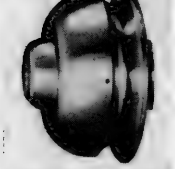
All aluminum, even solid aluminum supporting posts. Discharge direct—no additional static created. Motor assembly vibration isolated. Non-overloading, aluminum wheel.



Direct Drive Propeller Model FD, Capacities to 4,020 cfm

Pressure type aluminum propeller. Deep spinning means unrestricted air flow. Power assembly floats on vibration isolators. Venturi-type outlet prevents backdraft.

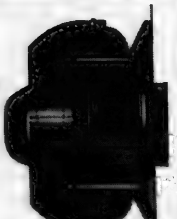




Direct Drive Wall Ventilator Model W, Capacities to 2,580 cfm

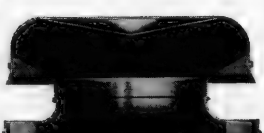
Outer baffle makes unit completely weatherproof. From 7" to 18" wheel—all aluminum—backwardly inclined. Weatherproof sealer on mounting flange. Round duct work is easily attached.

Patent No. 2805615



Pressure Relief Ventilator Model PR, from .1964 to 5.157 square foot throat area

Inverted cone guides air flow—reduces turbulance.



Large outlet area reduces pressure loss.
One-piece spun aluminum weatherproof top cap.
One piece spun aluminum base.

Ratings in accordance with standard test code by Texas Engineering Experiment Station, an approved AMCA test laboratory.

Write for Catalog, or see our condensed catalog $\frac{20c}{CO}$ *in Sweet's Architectural File.*

COOK **LOREN COOK COMPANY**

Berea, Ohio

In Canada write to H. F. Clarke, Ltd., 421 West Broadway, Vancouver, B. C
Ventilators CB, CD & W are CSA Approved

low-cost
HEAT ZONING

with **easy-to-install**
ZONVALVE

¾" I.P.S. shown

Now – the comfort of multiple-zone heating at a fraction of the former cost. ZONVALVE, new thermostatically-controlled motorized valve, replaces ordinary radiator valve *without plumbing change.* On new installations, ZONVALVES can be used on radiators or branch lines.

ZONVALVES are made in all standard pipe and tubing sizes. *Low wiring cost* – because motor operator is low voltage. All ZONVALVES equipped with auxiliary switch to start burner or circulator when open.

ZONVALVE is designed for steam and hot water systems. *Unconditionally guaranteed.* Ideal for private homes, factories, office buildings, hotels and motels.

for details write to **HEAT-TIMER CORP.** DEP'T. D-4
657 BROADWAY, NEW YORK 12, N. Y.

Air Cooling COILS
2 to 15 Ton CAPACITY

NEW Complete Line

REMPE

COMPLETE WITH MULTI-OUTLET EXPANSION VALVES MADE-ON— READY TO INSTALL

4 Row Coils — for residential jobs.

6 Row Coils — for commercial jobs.

Precision built to insure top performance and to give trouble-free service.

Write for bulletins and prices.

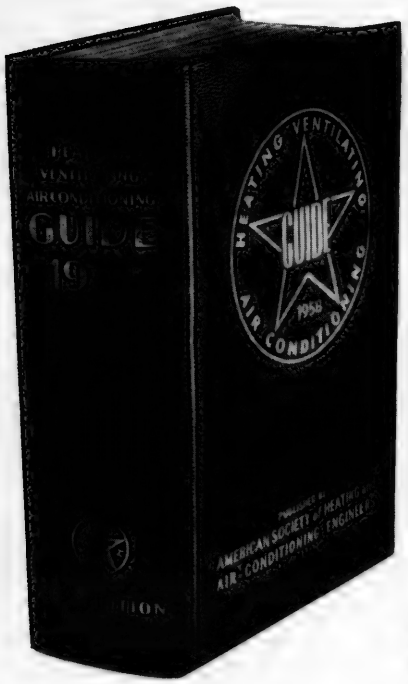
Complete facilities for fabrication of pipe coils — all types — all materials. Engineering service. Send details for price.

HEAT TRANSFER EQUIPMENT REMPE CO. Since 1890

REMPE COMPANY

358 N. Sacramento Blvd., Chicago 12, Ill.

ENGINEERS, CONTRACTORS
ORDER YOUR COPY NOW!



HEATING VENTILATING AIR CONDITIONING

GUIDE 1958

LARGEST EDITION IN 36 YEARS

14 Chapters Revised, Enlarged

1272 Page Technical Data Section

503 Page Catalog Data Section

Published By The

AMERICAN SOCIETY OF HEATING AND

AIR-CONDITIONING ENGINEERS

$12.00 postpaid; remittance required with order.
Outside U. S. and Canada remit in U. S. dollars.

The 1272 pages contained in the Technical Data Section are compiled from all available sources. No realistic amount of reviewing and condensing has resulted in the number of pages being reduced. Worthwhile and needed technical information continues to appear so rapidly that the technical Data Section must be expanded with each successive edition of The Guide.

REVISIONS, ADDITIONS

Among the Technical Data Section revisions and additions are (1) addition of both a description and a design method for high velocity air duct systems, (2) an enlarged section on the heat pump, (3) new information on exhaust hood performance and design for hot and cold processes, (4) a simplified presentation of industrial drying principles, calculations, and system design, (5) extension of data on heavy fuel oils and their use, with preheating, in automatic fuel burning equipment, (6) new data on heat gain through glass block used in skylights, requirements for shading glass, and basic principles involved in calculating heat flow through glass area, (7) a general revision of the chapter on radiators, convectors, baseboard and finned-tube units and addition of new data on their ratings, and performance, (8) a revision of ranges of capacity for electrical heating units and a method of determining operating cost for these units, (9) an enlarged section on performance and testing of air cleaners, (10) extension of list of allowable concentrations of air contaminants, (11) and increased number of codes and standards of interest to users of THE GUIDE.

These changes appear in the following chapters: *Chapter 8—Air Contaminants; Chapter 13—Cooling Load; Chapter 14—Fuels and Combustion; Chapter 15—Automatic Fuel Burning Equipment; Chapter 16—Heating Boilers; Furnaces, Space Heaters; Chapter 22—Radiators, Convectors, Baseboard and Finned-Tube Units; Chapter 29—Central Systems for Air Conditioning; Chapter 31—Air Duct Design; Chapter 33—Air Cleaning; Chapter 36—Refrigeration; Chapter 41—Electric Heating; Chapter 45—Industrial Exhaust Systems; Chapter 47—Industrial Drying Systems;* and *Chapter 53—Codes and Standards.*

Other changes and additions can be found throughout the Technical Data Section which has undergone detailed study to keep all data abreast of current practice, and wherever possible to improve its presentation.

The general format of the Technical Data Section is preserved and arranged in 7 sections as in earlier editions: I—Fundamentals, II—Human Reactions, III—Heating and Cooling Loads, IV—Combustion and Consumption of Fuels, V—Systems and Equipment, VI—Special Systems, and VII—Instruments and Codes.

AMERICAN SOCIETY OF HEATING AND AIR-CONDITIONING ENGINEERS — HV
62 Worth St., New York, N. Y.

Enclosed is $12.00 for standard edition of the HEATING VENTILATING AIR CONDITIONING GUIDE 1958. It is understood I may return it within 10 days if it is not satisfactory and my money will be refunded.

Name .....

Company .....

Address .....

City and State .....

(Please Check One)

—— Consulting Engineer —— Utility

—— Government Depts. —— Manufacturing Exec.

—— Contractor —— Industrial

—— Sales Engineer —— Operating

—— Other _____

AirMpeler

LO-BOY CENTRIFUGAL ROOF EXHAUSTERS

Enhance The Beauty Of Building Skylines

Pats. Pend.

Lowest Silhouette Design

FORWARD OR BACKWARD CURVE WHEEL WITHIN . . . . OR OUT OF SCROLL HOUSING

Motor mounting on side of structure support . . . out of line of air stream reduces height of Lo-Boy models nearly 50% of older designs.

LOW WIND RESISTANCE
SIZES 10"-72" 600-47,000
CERTIFIED C.F.M. RATINGS

- **QUALITY**
- **BEAUTY**
- **PROVEN PERFORMANCE**

See Sweet's File 20c/Amm or Write for bulletin AC100-58

AMMERMAN CO., INC.
109 North Second St.
Minneapolis 1, Minnesota
MEMBER OF THE AIR MOVING & CONDITIONING ASSN.

CLASSIFIED ADVERTISING

Sold at $12 per column inch.

MANUFACTURER'S AGENTS

An established manufacturer with 25 years experience producing ventilating equipment is looking for manufacturers' agents in many sections of the country to sell their new line of industrial fans. The products include axial flow and tubeaxial fans, both direct and belt driven, and power roof ventilators.

Please reply Box 914, Air Conditioning, Heating & Ventilating, 93 Worth St., New York 13, N. Y.

PRINTED FORMS available for immediate shipment. Heating & oil burner materials form, burner service record cards, service order forms, inspection information form, survey sheet and others. Also can supply BURNER SERVICE form in 8 part EZE-SNAP with 2 carbons in each set, 1200 sets IMPRINTED with your name, address and telephone, only $20.40. Send for samples—no obligation. Write Dept. AC, Degree Day Systems, 39-30 58th St., Woodside 77, N. Y.

FOR SALE — Ammonia & Freon Equip.
1—13¼x9 Frick Booster Compressor, Synch. Motor; 3—5¾x4 Frick Booster Compressors, V-belt; 1—5x5 Frick ammonia compressor, V-belt; 1—8x8 Frick ammonia compressor, V-belt; 1—9x9 Frick ammonia compressor, V-belt; 1—30HP Chrysler Freon condensing unit; 2—75-ton S&T Acme Freon Condensers; 1—100-ton S&T Frick Freon condenser; 1—36"x16" Frick ammonia Brine cooler; all in excellent condition.
R. H. Bozman & Brothers
1050 Branby Street, Baltimore 2, Md.

EL PASO, TEXAS cooling and heating plant for sale. Offices, factory, storage. No equip. 27,000 sq. ft. ground. Price: $65,000—½ cash, bal. 10 yrs. Area has essentials for lucrative business—low power, labor, climate, sources. $90,000,000 allocated this territory. Write Hampton S. Smith, 2223 Montana, El Paso, Texas.

We Need Your Help to Give You Better Service

Please include your CITY POSTAL ZONE NUMBER in your address when writing to us about . . .

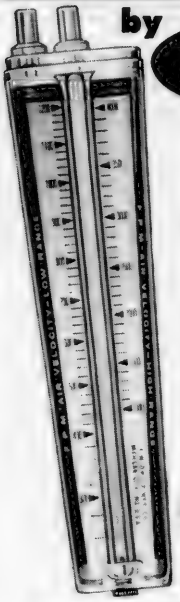
. . . your present subscription
. . . renewing your subscription
. . . ordering new subscriptions.

We have pledged to the Post Office Department that we will cooperate with them to help achieve the most economical and efficient means of delivering your magazines. To do this we must include the postal zone number for subscribers' addresses in all zoned cities. If your address has a postal zone number, use it at all times.

AIR CONDITIONING, HEATING AND VENTILATING
43 WORTH ST., NEW YORK 13, N. Y.

new No. 460 AIR METER

by Dwyer



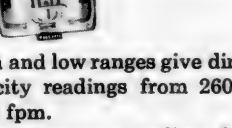
An All Purpose Low-Cost Instrument for Static Pressure and Air Velocity Measurements

High and low ranges give direct velocity readings from 260 to 4000 fpm.

Static pressure readings from .005 to 1.0 inches of water.

Complete with every accessory for adjusting and balancing air conditioning, heating and ventilating equipment.

Fits in shirt pocket.



Supply Grille Velocity

Return Grille Velocity

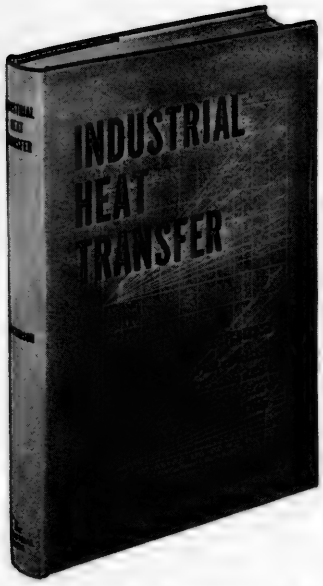
Over-Fire and Smoke Pipe Draft

Static Pressure

WRITE FOR BULLETIN B-9

F. W. DWYER MFG. CO.
P. O. Box 373N
Michigan City, Indiana

Time-Saving Working Charts Speed Solution of Heat Transfer Problems



The author, F. W. Hutchinson, is Professor of Mechanical Engineering at the University of California. His knowledge of heat transfer is well-grounded on practical experience as well as theory, as he acts as consultant on heat transfer problems for many industrial firms.

336 Pages

$6.00

In Canada or overseas, $6.80

A Combined Text and Reference Book for the Practicing Engineer as well as the Student of Heat Transfer

INDUSTRIAL HEAT TRANSFER, by F. W. Hutchinson, provides a selective, time-saving approach to methods of heat transfer analysis. It presents and discusses equations finding the widest industrial application, analyzes their derivation, and then brings the subject to an eminently practical conclusion by providing graphs which permit direct visual solution of the most commonly encountered problems. The 123 working graphs are equal in accuracy to the equations from which they are derived, thereby saving time and reducing the possibility of error in making calculations.

Of particular interest to the industrial engineer is the section covering forced convection of gases and liquids, whether heating or cooling, while flowing within or outside of pipes. Analytical solution for these cases would require the determination of viscosity, specific heat and density—all as functions of temperature. The graphs simplify these cases by permitting direct evaluation of the heat transfer characteristics of each gas or fluid without requiring the determination of any physical properties. Graphs are provided for: air, acetylene, ammonia, benzene, chlorine, ethane, ether, helium, oxygen, pentane, steam, sulfur dioxide, water, and 57 other industrially used liquids and gases.

Five-Day Free Inspection!

If you are a student of heat transfer, or are engaged in practical heat transfer work, order your copy of INDUSTRIAL HEAT TRANSFER today. If you wish, you may take advantage of our Five-Day Free Inspection Plan. See details in coupon below.

---------- **ORDER FORM** ----------

THE INDUSTRIAL PRESS, 93 Worth Street, New York 13, N. Y.

Please send me ..... copies of INDUSTRIAL HEAT TRANSFER at $6.00 each.

Name .....

Company .....

Street and No. .....

City ..... Zone ..... State .....

Home Address .....

(Please fill in if you want book sent to your home.)

City ..... Zone ..... State .....

ACHV 4/58

CHOOSE YOUR MOST CONVENIENT METHOD OF PAYMENT

☐ **I enclose check or money order covering payment in full. (Note price applying to foreign orders.) Send book postpaid.**

☐ **Send book under Five-Day Free Inspection Plan. If I decide to keep book I will send payment, plus postage charges, within five days.**

☐ **Bill me** ☐ **Bill company**

A new employee gave us the idea...

Several weeks ago, a young chap being processed by our personnel people—you know, for insurance, hospitalization and so forth—asked whether our company had a Payroll Savings Plan for U. S. Savings Bonds.

This simple question made us realize that while we had a Payroll Savings Plan available we had not promoted it lately among our employees.

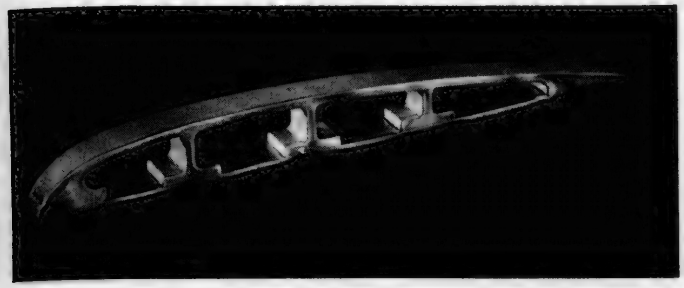
We contacted the State Director of the Savings Bonds Division of the U. S. Treasury and discussed this matter. He helped us work out a promotion plan to contact every employee on the Payroll, and thereafter, each new employee we hired. He supplied literature, posters and so forth and helped train the canvassers to do an educational promotion among our employees.

In a short time, with practically no disruption of our business, our campaign was successful. The enthusiastic response floored us. This proved to us employees *want* to save part of their pay and they welcome the convenient Payroll Savings Plan for buying U. S. Savings Bonds.

Your State Director, Savings Bond Division, U. S. Treasury Department, will be glad to help you install The Payroll Savings Plan, or build participation in an existing plan. Write: Savings Bonds Division, U. S. Treasury Department, Washington 25, D. C.

The United States Government does not pay for this advertising. The Treasury Department thanks, for their patriotic donation, the Advertising Council and

AIR CONDITIONING, HEATING & VENTILATING



Cross section shows structural superiority of Aeromaster's new, extruded aluminum-alloy blades in diameters from 9′ to 22′.

NEW! EXTRUDED ALUMINUM Blades on AEROMASTER* fans only

AEROMASTER'S new, extruded aluminum blades combine in one design the advantages of a light weight metal, a hollow structure and the superior strength of wrought metal... Silicon-magnesium aluminum alloys resist corrosion. Their fine grain structure, high tensile strength and increased endurance eliminate danger from wear, vibration, and metal fatigue... true airfoil blade sections assure maximum air delivery... adjustable blade pitch angle permits decrease of fan load to an accurate minimum horsepower requirement.

The AEROMASTER fan is easily assembled *in the tower.* No special handling equipment is necessary. AEROMASTER fans cost less to install, less to operate, less to maintain!

For more details write to KOPPERS COMPANY, INC., Aeromaster Fan Dept., 6904 Scott Street, Baltimore 3, Maryland.

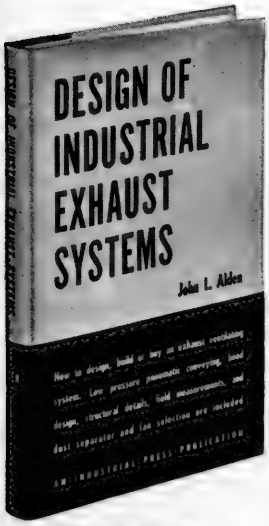
KOPPERS

Aeromaster Fans

Engineered Products Sold with *Service*

*Koppers Trademark

THE ABC's OF INDUSTRIAL EXHAUST SYSTEMS



2nd Edition

Completely Revised

How To Design, Build or Buy Efficient Industrial Exhaust Systems

All in one convenient volume—everything you need to know to design, build or buy an industrial exhaust system that meets the demands of the industrial hygiene expert and the law. DESIGN OF INDUSTRIAL EXHAUST SYSTEMS presents the facts about the various types of exhaust systems for the removal of dust, fumes, vapors, gases, steam. Concise information is also included on low pressure conveyors for carrying bulky materials, such as grain or sawdust, by air stream.

You can design practically any type of exhaust system completely from the information this book contains—without using any other references. Send for it today!

$3.50

In Canada or overseas, $4.25

252 Pages **120 Drawings, Charts and Diagrams**

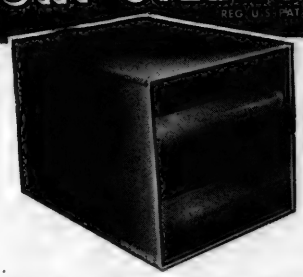
THE INDUSTRIAL PRESS, 93 Worth Street, New York 13, N. Y.

COMPACT . . LIGHTWEIGHT . . STREAMLINED AND ACOUSTICALLY EFFICIENT

NO JOB WAITS FOR

UNI-SILENCER

REG. U.S. PAT. OFF.



Single Unit Standard Uni-Silencer

THE NEW SILENCER FOR AIR CONDITIONING AND VENTILATING SYSTEMS!

UNI-SILENCERS* and UNI-RESONATORS* have been designed specifically to reduce the airborne noise generated by fans in industrial ventilating and air conditioning systems.

UNI-SILENCERS* compare favorably in cost with conventional duct lining.

Low in cost from both the original purchase and installation view, Uni-Silencers are delivered in cartons weighing about 75 lbs. each. They may be easily and inexpensively transported into the building, to the specific location required.

When air flow, pressure drop, or noise attenuation require the use of more than one Uni-Silencer, then units (singles, halves or quarters) may be set together using built-in slip joints. Thus in series, or in parallel Uni-Silencers will fit any condition or requirement.

3 Uni-Silencer singles and 3 half units set together in a block

UNI-SILENCERS* are supplied in 3 sizes: Full Unit—24x24x32"; Half Unit—12x24x32"; Quarter Unit—12x12x32".

UNI-SILENCERS* are sold on a *guaranteed* basis. Interior and exterior surfaces are smooth, made of perforated and unperforated metal to reduce resistance to a minimum.

Complete engineering service is yours, FREE!

*Reg. U.S. Pat. Off.

Fill out and mail coupon for literature today!

ELOF HANSSON, INC., Acoustical Division
711 THIRD AVE., N.Y. 17, N.Y. Dept. U2-A

Please send complete literature on Uni-Silencers and Uni-Resonators, without charge or obligation.

NAME .....

ADDRESS .....

CITY .....ZONE...STATE.....

Alphabetical Index of Advertisers

Adsco Div., Yuba Consolidated Industries, Inc. 32
Aerofin Corp. 9
Aerovent Fan Co., Inc. ..... *
Air Devices, Inc. 111, 150
Air Filter Corp. ..... *
Air-Maze Corp. ..... *
Air Moving & Conditioning Association, Inc. ..... Insert 25
Airtemp Div., Chrysler Corp. 139
Alco Valve Co. 35
Allen-Bradley Co. 55
Allen Cooler & Ventilator, Inc. 127
Allin Manufacturing Co. 151
Allis-Chalmers Manufacturing Co. .. 26
American Blower Div., American-Standard 48
American Brass Co. 21
American Society of Heating & Air-Conditioning Engineers 155
American-Standard 48
Ammerman Co., Inc. 156
Anemostat Corp. of America 11
Armstrong Machine Works 1

Babbit Steam Specialty Co. 133
Barber-Colman Co. 119
Bell & Gossett Co. 47, 125
Bethlehem Steel Co. 46
Binks Manufacturing Co. 132
Boiler Engineering & Supply Co., Inc. 24B
Boosey, Norman, Mfg. Co. ..... *
Bradley Washfountain Co. 149
Bryan Steam Corp. ..... *
Buensod-Stacey, Inc. ..... *
Buffalo Forge Co. 37
Burnham Corp. 135
Burt Manufacturing Co. 136
Byers, A. M., Co. ..... *

Cain Manufacturing Co. 123
Chicago Pump Co. 18
Clarage Fan Co. ..... Inside Back Cover
Classified Advertisements 156
Cleaver-Brooks Co., Boiler Div. 130
Construction Specialties, Inc. ..... *
Cook, Loren, Co. 154
Cordley & Hayes ..... *
Coyne & Delany Co. ..... *
Crane Co. 42
Curtis Mfg. Co. 40

Davis Engineering Corp. .. Insert bet. 26-27
Deming Co. ..... *
Dravo Corp. ..... *
Drayer-Hanson Div., National-U. S. Radiator Corp. 142
Dunham-Bush, Inc. 19
Dwyer, F. W., Manufacturing Co. ... 156

Elgen Manufacturing Corp. ..... *
Elgo Shutter & Mfg. Co. ..... *
Ellison Draft Gage Co., Inc. 151
Emerson Electric Mfg. Co. 36

Fafnir Bearing Co. 41
Fairbanks Co. ..... *
Field Control Div., H. D. Conkey & Co. ..... Insert bet. 42-43
Flexaust Co. 138
Frick Company 56

Gem Clay Forming, Inc. 149
General Air Products Corp. 145
General Chemical Div., Allied Chemical & Dye Corp. 43
General Electric Co. ..... *
Gustin-Bacon Manufacturing Co. 31

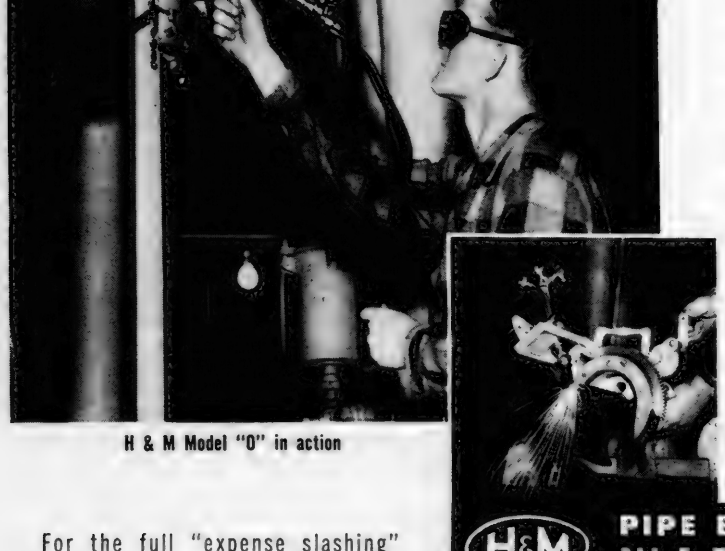
H & M Pipe Beveling Machine Co. ... 160
Halstead & Mitchell ..... *
Hammond Brass Works 49
Hansson, Elof, Inc. 159
Harris, Arthur & Co. 123
Hartzell Propeller Fan Co. ..... *
Heat-Timer Corp. 154
Henderer's, A. L., Sons ..... *
Henry Valve Co. ..... *
Hoffman Specialty Manufacturing Corp. 15

Illinois Engineering Co. ..... *
Illinois Testing Laboratories, Inc. .... *
Industrial Press 152-153, 157
Infra Insulation, Inc. 7
International Boiler Works Co. ..... *
Iron Fireman Manufacturing Co. 121

Jackes-Evans Manufacturing Co. 149
Jenkins Bros. 52
Jenn-Air Products Co., Inc. 28
Johnson Service Co. ..... Back Cover
Joy Manufacturing Co. ..... *

Kenco Pump Div., American Crucible Products Co. ..... *

Decrease pipe welding expense with H & M Pipe Cutting and Beveling Machines



H & M Model "O" in action

For the full "expense slashing" story — write H & M TODAY.

COMPLETE ACCURACY WITH UNSKILLED LABOR

Precision cuts and bevels are literally "cranked out" with an H & M machine, even when operated by your most inexperienced workman. The H & M Pipe Cutting and Beveling Machine is completely portable and extremely easy to operate, with a design that stresses speed, accuracy and durability.

The H & M Shape Cutting Attachment quickly and efficiently cuts saddles, ells, tees or other patterns for special pipe fabrication, and the *Out-of-Round Attachment* cuts and bevels oval or other out-of-shape pipe with equal precision and accuracy.

H & M equipment will save enough time and labor in the pipe cutting and beveling phase of your welding operation to greatly reduce your overhead and increase your profits. Available in sizes to fit 1½" to 36" pipe.

PAT. APPLIED FOR

H&M TM. REG.

PIPE BEVELING MACHINE COMPANY
311 E. Third St. Diamond 3-0241
TULSA, OKLAHOMA

Alphabetical Index of Advertisers

Kewanee Boiler Div., American-Standard ..... *
King Zeero Co. 147
Koppers Co., Inc. 159
Kramer Trenton Co. 44

L.O.F. Glass Fibers Co. 34
Lennox Industries, Inc. 17
Lewin-Mathes Co. 45

Magnetrol, Inc. ..... *
Marley Co. 27
Marsh Heating Equipment Co. 137
McDonnell & Miller, Inc. 51
McQuay, Inc. 22-23
Mercoid Corp. 140
Minneapolis-Honeywell Regulator Co. 113-117
Modine Manufacturing Co. ..... *

Nash Engineering Co. 58
National Tube Div., United States Steel Corp. ..... *
New York Blower Co. ..... *
Niagara Blower Co. 127

Patterson-Kelley Co., Inc. 5
Peerless Electric Co. 30
Penn Ventilator Co. 148
Petro 143
Petrometer Corp. 146
Philco Corp. ..... *
Polis, J. D., Manufacturing Co. ..... *
Power Line Fan Co., Inc. 128
Powers Regulator Co. 29, 57

Quickdraft Corp. 151

Reading Tube Corp. 24A
Rempe Co. 154
Research Products Corp. ..... *
Revere Copper & Brass, Inc. 109
Reznor Manufacturing Co. 161
Richmond Engineering Co., Inc. 53

Sarco Co., Inc. 13
Simplex Ceiling Corp. 140
Skidmore Corp. 20
Spence Engineering Co., Inc. 54
Sporlan Valve Co. 129
St. Clair Rubber Co. 147
Standard Stamping & Perforating Co. 141
Sterling, Inc. ..... *
Superior Combustion Industries, Inc. .. *
Swartwout Co. 134
Symmons Engineering Co. 144

Taco Heaters, Inc. ..... *
Thermal Engineering Corp. 50
Todd Shipyards Corp. 147
Trane Co. ..... *
Typhoon Air Conditioning Co., Inc. .. 131

United Sheet Metal Co. ..... *
United States Steel Corp. ..... *

Wagner Electric Corp. ...Insert bet. 16-17
Walworth Co. ..... *
Want Advertisements 156
Waterloo Register Co., Inc. ..... *
Watts Regulator Co. ...Inside Front Cover
Webster, Warren & Co. 2
Weil-McLain Co. 24
Weil Pump Co. 123
Weirton Steel Co., Div., National Steel Corp. 33
Weksler Instruments Corp. ..... *
Wheeler, C. H., Mfg. Co. ..... *
Wiegand, Edwin L., Co. 149
Winnen Incinerator Co. ..... *
Wing, L. J., Mfg. Co. 38-39
Worthington Corp. 133

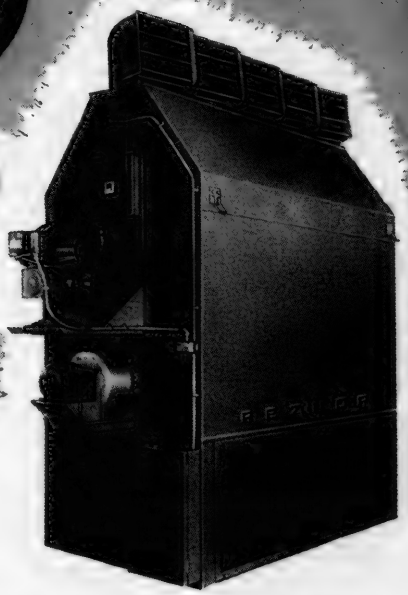
Yarnall-Waring Co. ..... *
York Corp. 16, 162

Here's the answer to your

BIG SPACE HEATING PROBLEMS

Reznor-Olson

STAINLESS STEEL DIRECT FIRED HEATERS



These units are designed for heating factories, warehouses, garages, airplane hangars, gymnasiums and other large open areas. They pick cold air up off the floor, distribute heated air overhead at high velocity—either direct or thru ducts. In addition to space heating installations, Reznor-Olson heaters are well-suited for use in make-up air systems and in drying and other process applications.

Reznor-Olson heaters are available in ten sizes — 400,000 to 2,000,000 Btu — with gas, oil or dual-fuel burners. They may be floor mounted for top discharge or suspended for down-blast or horizontal discharge.

New Bulletin gives Complete Specifications

Complete specification information — including dimensions, control details, temperature rise, air delivery and fuel consumption — is included in a new bulletin, F-57A-RO. If you don't have a copy of this bulletin in your files, just fill out and mail the coupon below. Do it today.

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED UNIT HEATERS

Reznor Manufacturing Company, 64 Union St., Mercer, Pa.

Please send me a copy of your bulletin F-57A-RO which gives complete specification data and construction details on Reznor-Olson direct fired heaters.

Name_____

Company_____

Street_____

City_____ Zone_____ State_____

AN AIR-CONDITIONING VALUE PACKAGE FROM YORK

NEW FAN COIL UNIT

- **Easy, low-cost installation! Widest variety of mountings! Broadest selection of models in the industry!**
- **Entire unit covered by UL approval!**
- **Split-capacitor motors cut power consumption by as much as 40% . . . require fewer electrical circuits . . . have 30% greater life expectancy!**

Here's good news from York: a packaged fan coil unit that combines important engineering advances with real benefits of interest to mechanical contractors and consultants.

WIDER SELECTION! York is the only manufacturer offering a choice of floor, wall, and ceiling-mounted units . . . with decorative casings or furred-in enclosures. There are 20 models to choose from — the longest line in the industry.

SIMPLER INSTALLATION! Water supply, return and drain lines are the only piping required. No ductwork or central air equipment, of course. S.A.E. coil connections mean no sweat soldering. Left or right-hand hookups are interchangeable in the field. Wall and ceiling-hung units eliminate problems of levelling, carpet cutting and baseboard changes. Units and casings slide onto special hanger rails in seconds. There's no exposed wiring; flexible steel conduit is used throughout.

TOP-QUALITY PERFORMANCE! The UL label covers every model. Few competitive units offer this assurance of trouble-free service. Permanent split-capacitor motors are standard in York fan coil units. Their reduced power consumption permits more units per electrical circuit, fewer circuits per building. They run quieter, cooler, slower . . . assuring longer unit life, less maintenance.

THE PRICE IS RIGHT! From the moment York fan coil units arrive on site, they start saving time, money and headaches . . . for you *and* your client! That's because York designs with the *real cost* of air-conditioning in mind. The features listed above are just a few of the many you'll want explained in detail. Consult your classified directory for the name and address of your local York sales representative . . . or write for Bulletin I-216, York Corporation, York, Pa.

YORK CORPORATION

SUBSIDIARY OF BORG-WARNER CORPORATION

Millions Live Better with York

IN CANADA: CANADIAN ICE MACHINE COMPANY LTD., TORONTO

AND PRODUCT INFORMATION SERVICE

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement.

NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

PRESSURE REGULATOR LINE..... includes units for water, steam, or air—pressure regulators and plumbing and heating safety valves and controls of the finest quality. Two bulletins describe complete line.
Inside Front Cover — Item 200

44-PAGE STEAM TRAP BOOK..... plus two reprints explaining facts about trap operation on vacuum return service are offered by leading manufacturer. Ad explains application of inverted bucket steam traps.
Page 1 — Item 201

THROUGH-THE-WALL CONDITIONER offers complete flexibility—air conditioning in summer plus winter comfort using hot water or steam. Complete thermostatic control. Costs less than central chilled water system or air system using ducts. Bulletin available.
Page 2 — Item 202

HEAT EXCHANGER CATALOG..... discusses a new product line of forced boiler water heat exchangers for use below the water line of steam or hot water boilers.
Page 5 — Item 203

EXTENDED HEAT SURFACE ..... is the only product of this company whose unequalled experience, facilities, and engineering service assure you of high efficiency, long life, and low maintenance and service costs for the heat exchanger you specify. Information available.
Page 9 — Item 204

HIGH-CAP. DUAL-DUCT MIXERS..... called turbulators are standardized, constant volume, high capacity units handling from 800 to 7000 cfm. An economical solution to many air distribution problems in which a large volume of air at controlled volume or pressure, and temperature is involved. Bulletin gives engineering data.
Page 11 — Item 205

ENGINEERED STEAM SPECIALTIES.. are designed to meet industry's needs. Among these are: inverted bucket trap, dirt strainer, pressure reducing valve, temperature regulator, and F & T trap. Information available.
Page 15 — Item 206

AREA-BY-AREA COOLING PLAN..... for packaged units enables businesses with limited budgets to condition the important zones first; air condition only those areas that require it. Information available.
Page 16 — Item 207

ELECTRIC MOTOR DATA SHEET..... discusses repulsion-start induction motors for starting heavy loads with low current; capacitator-start motors for normal starting applications and split phase motors in fractional horsepower sizes for low starting torque requirements. Bulletins available.
Insert bet. 16-17 — Item 208

WARM AIR INDUSTRIAL HEATERS.. are available in ratings up to 2,000,000 Btu per hr featuring 4-pass counter-flow design. Double casing with metal radiation shield, stainless steel combustion chamber, and a single master control. Complete specifications and engineering data available.
Page 17 — Item 209

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

CLOG-PROOF SEWAGE PUMPS..... are standard equipment in fine buildings. Only liquid is handled by impeller. Solids retained in strainer housing until cleanly flushed to sewer. Company offers complete details.
Page 18 — Item 210

REMOTE AIR COOLED CONDENSER.. requires only 1/3 of the refrigerant charge used by competitive models due to exclusive inner-fin construction. Technical assistance in installation is offered. Information available.
Page 19 — Item 211

VACUUM AND BOILER FEED PUMPS are designed for each and every heating requirement. Both single and duplex units automatically adjust to varying conditions. Capacities range from 5000 to 100,000 sq ft EDR. Bulletin available.
Page 20 — Item 212

COPPER TUBE DRAINAGE SYSTEMS.. are more economical to install because copper is light and easy to cut, comes in long lengths and because the journeymen can turn out a neat job that they can be proud of. Descriptive literature available.
Page 21 — Item 213

CONDITIONING COILS AND UNITS.... are true-rated, your assurance that a heating or cooling system will deliver design capacity. A coil and a unit especially designed for every conceivable purpose. Information available.
Pages 22-23 — Item 214

HEAVY-DUTY BOILERS ..... are of proven efficiency when equipped with horizontal rotary burners using heavy oil. Design features assure the most favorable burning conditions and efficient heat absorption. Certified I-B-R ratings. Literature available.
Page 24 — Item 215

PEACE OF MIND—COPPER TUBE.... —orders are personally followed up by company's executives to assure you of getting exactly what you want—exactly when you want it. Information available.
Page 24A — Item 216

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66
67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
89 90 91 92

200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221
222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243
244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265
266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287
288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306

PLEASE PRINT April H-58

This service available only to U.S. and Canadian readers.

Name .....

Title or Job Function .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone** ....**State** .....

This card is void after July 1, 1958

TWO-PASS DESIGN BOILER..... is fire-tested and guaranteed for better than 80% efficiency. Exclusive spinning gas technique heats all return tubes thoroughly and evenly in just two passes, assuring longer service life. Bulletin available.
Page 24B — Item 217

AMCA CERTIFIED RATINGS..... are the specifiers' best assurance of properly rated air moving equipment. Bulletins are available which give full details.
Insert Page 25 — Item 218

CUSTOM-ASSEMBLED PUMP LINE.... is suitable for 99% of all air-conditioning applications because they are assembled for your application from standard components. A tailored pump at a mass-produced price. Information available.
Page 26 — Item 219

SAFETY FUEL OIL HEATERS..... are found in hundreds of trouble-free installations. Accepted and specified in all oil-burning areas in the country. New design separates boiler water and oil. Bulletin available.
Insert bet. 26-27 — Item 220

ELEVEN NEW COOLING TOWERS.... present a new approach to cooling tower durability under any service conditions, combating corrosive influences of all types with liberal use of plastics. Information available.
Page 27 — Item 221

LOW CONTOUR EXHAUSTERS..... are unique in that their installed height is several inches lower than other typical competitive units. This may amount to 8 or 10 inches. Information available.
Page 28 — Item 222

2-TEMPERATURE CONTROL SYSTEM will pay back its cost on fuel savings alone and also provide comfort for teachers and students. Information available.
Page 29 — Item 223

AMCA-RATED AIR MOVERS..... are built by charter member of AMCA and produced to AMCA standards. Backward curve blower and centrifugal roof ventilator are two in its expanded line. Bulletins available.
Page 30 — Item 224

DUCT INSULATION AND DUCT LINER available through a nationwide network of distributors. Blanket rolls of insulation wrap quickly around ducts of every size and shape. Liner is easily applied and acoustically engineered to silence duct noise. Information available.
Page 31 — Item 225

COMPLETE HEATING & PIPING LINE includes suction oil heaters, fuel oil preheaters, instantaneous water heaters, storage water heaters, expansion joints, and pipeline accessories. Information available.
Page 32 — Item 226

BEAD, CRIMP, TWIST, DRAW, WORK this zinc-coated steel sheet to the limits of the steel itself without chipping or peeling. Treated to inhibit wet storage stain. Free 12-page booklet contains facts, technical data.
Page 33 — Item 227

GLASS-RESIN FIBER DUCT LINER... assures better working atmosphere for employees by absorbing fan and motor noises from new high velocity air conditioning systems. Virtually eliminates condensation problems because duct serves as vapor barrier. Information available.
Page 34 — Item 228

VENTURI-FLOW DISTRIBUTOR..... assures equal distribution to all passes of a multi-circuit evaporator with a low pressure drop from 25 to 150% of rated capacity. One-piece construction. No orifices, plates, or nozzles needed for capacity regulation. Bulletin available.
Page 35 — Item 229

MOTOR-DRIVE REQUIREMENTS..... are met by skilled specialists who know motors and the needs of appliance and equipment manufacturers. Their on-the-spot service is important when tomorrow can be too late. Information is available.
Page 36 — Item 230

PACKAGED UNIT FEATURES INCLUDE easy-to-install knock-down panel construction, wide selection of combinations, space-saving designs, complete range of capacities, and attractive appearance. Information available.
Page 37 — Item 231

REVOLVING UNIT HEATERS..... eliminate hot blasts and cold spots. Warm air outlet rotates slowly and continuously, setting up air motion which distributes the heat evenly. Information available.
Pages 38-39 — Item 232

HIGH-PROFIT CONDITIONING LINE.. features maximum dependability, customer satisfaction, pre-sold prospects (national advertising beamed at virtually every prospect), and priced competitively with generous profit margin. Information available.
Page 40 — Item 233

CUSHIONED BALL BEARINGS..... permit simpler design and construction of air conditioning systems. The grommet that encases each bearing is made of electric-current-conducting rubber which means: no metallic grounding springs or clips are needed to run off static electricity; possible source of noise is eliminated. New bulletin available.
Page 41 — Item 234

BRASS GATE VALVE BULLETIN..... gives all specification data on line that has become the contractors' preference for hot water systems: 100-, 125-, and 150-lb classes with non-rising stem and wedge disc. Designed like high-pressure steel valves.
Page 42 — Item 235

TRIPLE-FUEL DRAFT REGULATOR.. is described in two-page removable data sheet. Unit approved by America's leading utilities. This data sheet No. 2 outlines applications, what to specify, size and location. Further information available.
Insert bet. 42-43 — Item 236

EXTRA-DRY REFRIGERANTS ..... have had their moisture content reduced almost to the vanishing point. Non-corrosive to standard equipment, non-toxic, non-flammable, stable and safe. Information available.
Page 43 — Item 237

DRY CONDENSING CATALOG..... includes standard air-cooled condensing systems up to 540 tons and units for heat pump applications with no horsepower limit.
Page 44 — Item 238

UNIFORM, PERFECT COPPER TUBE.. is the result of complete integration of operations of company that refines, fabricates, and sells, to meet exacting requirements. Information available.
Page 45 — Item 239

DUCTILE AND STIFF STEEL SHEET.. provides easy work-up and a strong, rigid sheet metal product. Galvanizing will not crack or flake. Information available.
Page 46 — Item 240

INSTANTANEOUS WATER HEATER.. saves replacing expensive hot water storage tanks. Comes equipped with booster pump. Large volumes produced by amazingly small units. Booklet explains application, selection, and installation.
Page 47 — Item 241

SELF-CONTAINED UTILITY SETS.... are assembled at the factory, ready for fast, easy installation. This ventilating equipment is pre-engineered, has certified ratings, and is available in most localities off the shelf. Catalog available.
Page 48 — Item 242

NEW BRONZE VALVE CATALOG..... describes individually pressure tested valves which, for instance, when rated at 150 lb must pass final inspection at individual hydrostatic test at 300 lb. Catalog describes complete line.
Page 49 — Item 243

HIGH-QUALITY CONDITIONING UNITS are made for every type building. Line includes central plant, multi-zone, sprayed coil, and heating and ventilating units, cooling and heating coils, and air cooled condensers. Specifications available.
Page 50 — Item 244

PUMP CONTROLS BULLETIN..... tells the whole story of this company's series of water level controls, cut off switches, etc., in a boiled-down, useful form with service recommendations, installation drawings, and wiring diagrams.
Page 51 — Item 245

SWIMMING POOL PIPING LAYOUT.... shown in ad by valve manufacturer. For details of valves to suit varying conditions, catalog is offered.
Page 52 — Item 246

HOT WATER STORAGE HEATERS.... have proven in many applications to provide dependable rust-free hot water for 100 different hospital chores. Engineers specify for all important hot water jobs. Catalogs available.
Page 53 — Item 247

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U.S.

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 52, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING

93 WORTH STREET

NEW YORK 13, N. Y.

AD-DIGEST SERVICE

AUTOMATIC REGULATING VALVES.. or any valve designed to control temperatures or pressures within tight limits can be affected by dirt or other foreign matter in steam lines. Trouble shooting is faster, downtime is reduced. Bulletin on these valves is available.
Page 54 Item 248

HIGH-QUALITY MOTOR CONTROLS.. are based on a simple solenoid design and offered in all starters through size 7. Only one moving part, assuring millions of trouble-free operations. Information available.
Page 55 Item 249

FIVE REFRIGERANT COMPRESSORS.. supply the refrigerant for chilled water for air conditioning the new Fulton Federal Building at Atlanta. Company's system, fully automatic, said to be highly satisfactory in every respect. Information available.
Page 56 Item 250

SELF-OPERATING TEMP. REGULATOR is one of many controls manufactured by this company. Automatically holds temperature at the right point and prevents losses caused by wasteful overheating. Often repays its cost 3 to 6 times a year when used on water heaters, industrial processes, heat exchangers, etc. Bulletin available.
Page 57 Item 251

COPPER WATER TUBE..... is the only practical answer for radiant panel heating. Easy-to-make solder fittings cost less to install than rustable material. Information available.
Page 109 Item 252

NEW AIR DISTRIBUTION MANUAL... contains 56 pages of useful data on the control and distribution of high velocity all-air systems. Company has had 75 years of practical experience in design, development and application of air handling systems.
Page 111 Item 253

TWO CONSTANT-VOLUME SYSTEMS.. for double duct application are described. One features new type of piston motor with nylon bearings which require less lubrication. The other features two pressure regulators assuring constant volume from each duct. Information available.
Pages 114-115 Item 254

PNEUMATIC VALVE AND MOTOR.... made of new materials with new designs to increase performance for control of steam or water. Valve features equal percentage throttling plug plus longer stroke. Information available.
Page 116 Item 255

UNIT VENTILATOR CONTROL TEAM consists of air stream thermostat, valve, damper motor, and room thermostat exclusively developed for unit ventilators. Information available.
Page 117 Item 256

CONTROL CENTER BROCHURE..... describes the electronic unit that is being included in more and more automatic controls specifications. This 8-page bulletin will be sent on receipt of ad and business card or letter-head.
Page 119 Item 257

FORCED DRAFT GAS-OIL BURNER.. enables forced draft firing for smaller boilers, especially the increasingly popular sealed firebox Scotch boiler. Specifications available.
Page 121 Item 258

FLEXIBLE DUCT CONNECTION..... is prefabricated—simply pull out desired length from dispenser-type carton, roll into round duct or form into square duct. Information available.
Page 123 Item 259

STAINLESS STEEL FLOATS..... have the inherent strength of stainless steel which makes them ideal for liquid level control operating under high pressure or high temperature. Catalog is available with technical float data.
Page 123 Item 260

SUBMERSIBLE SUMP PUMP PACKAGE priced lower than many conventional sump pumps. Operates under water. Flood-proof operation. Choice of three controls. Information available.
Page 123 Item 261

PUMPS FOR COOLING TOWERS ..... are really quiet because both pump and motor are equipped with long bronze sleeve bearings and because of the noise-dampening flexible spring-type coupler. Six-step manual for designing cooling tower systems is offered.
Page 125 Item 262

ROOF VENTILATORS..... made by this company include a low contour model, a large volume model for high velocities, wind driven turbine types and exhaust fans for corrosive fumes. Catalog with specifications and performance data is available.
Page 127 Item 263

EXACT MOISTURE CONTROL..... for product improvement, protection of materials, or for process or tests, with absorbent, results in simpler, more trustworthy, less expensive system, as dehumidification and temperature control are separated functions. Descriptive bulletins explain.
Page 127 Item 264

INDUSTRIAL HEATERS..... for space heating, drying, make-up air, oven applications, 400,000-2 million Btuh, feature 4-pass design, master control, stainless steel combustion chamber, double casing, metal radiation shield. Complete data offered.
Page 128 Item 265

FREE BOILER LAYOUT GUIDE..... offered by manufacturer of 4-pass fire tube boilers which have 5 sq ft of heating surface per boiler hp. Forced draft, controlled combustion maintains proper fuel-air ratio. Updraft construction.
Page 130 Item 266

COOLING TOWER BULLETINS..... describe how whisper-quiet operation is achieved and why minimum maintenance is needed. Also presents complete data on units.
Page 132 Item 267

PRIZES TO DEALERS..... including all-expenses paid, seven-day vacations for two to Bermuda are offered. Full details of air conditioning manufacturer's dealer program available.
Page 133 Item 268

ROOF VENTILATOR CATALOG..... describes units that will economically supply fresh air in rain or shine, whether windy or calm. Noted for maximum capacity per roof opening size, weatherproofness and economical installation. Catalog available.
Page 134 Item 269

PACKAGED SCOTCH TYPE BOILERS.. are available from stock for prompt shipment. Full ratings and data are offered on Scotch type boilers, boiler-burner packages, and compact boilers.
Page 135 Item 270

CONTINUOUS RIDGE VENTILATOR... exhausts more air per dollar than any other type and converts the roof ridge into a quick-acting giant air valve. Data book available.
Page 136 Item 271

FLOAT AND THERMOSTATIC TRAP.. for 0-15 psi or 15-125 psi in ¾ or 1-inch pipe size. Its dependability is attested by its thousands of users. Gets air out, keeps steam in. Heating specialties catalog available.
Page 137 Item 272

ADJUSTABLE SPROCKET RIM..... with chain guide provides safe, floor level valve operation. Pipe layout is simplified, and any size wheel is fit. Descriptive catalog sheet is available.
Page 138 Item 273

FLEXIBLE EXHAUST HOSE..... is made of strong Neoprene-coated cotton or nylon fabrics spiral-wire reinforced. Hose is installed for dust control, particularly at elbows and moving hoods. Information is available.
Page 138 Item 274

LOWEST-COST AIR CONDITIONING.. is guaranteed because you get the right equipment from an extensive selection of units that feature low operating and maintenance cost. Information available.
Page 139 Item 275

RADIANT-ACOUSTICAL CEILINGS .... provide complete integration for economy, comfort, and efficiency. Never caused condensation! Folder describes them.
Page 140 Item 276

REGISTER AND GRILLE CATALOG... illustrates complete line for custom control of warm air heating and for uniform year-round heating and cooling comfort.
Page 141 Item 277

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88
89	90	91	92																		
200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221
222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243
244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265
266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287
288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306			

PLEASE PRINT April H-58

This service available only to U.S. and Canadian readers.

Name .....

Title or Job Function .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone** ....**State** .....

This card is void after July 1, 1958

Ad-Digest

EVAP. CONDENSER BULLETIN ..... describes units that are hot-dip galvanized after fabrication. Company pioneered blow-through principle. Primary coil surface copper tubing.
Page 142 Item 278

READY-TO-GO BOILER-BURNER UNIT includes Scotch boiler with forced draft firing. Fuel, air and control systems installed and tested at factory. Catalog and specifications offered.
Page 143 Item 279

FAIL-SAFE MIXING VALVE..... for water has replaceable cartridge which houses all working parts. Never needs to be removed from line for costly servicing. Corrosion free. Information is available.
Page 144 Item 280

AIR DISTRIBUTION HANDBOOK..... is a new tool for engineers and contractors. Gives unified treatment of modern air distribution for new and existing buildings from inception to final installation of system. Permits selection of air diffuser best suited to your needs.
Page 145 Item 281

LIQUID DEPTH INDICATOR BULLETIN describes remote reading units. Hydrostatic pressure principle. Like having transparent tanks. Bulletin available.
Page 146 Item 282

ICE ACCUMULATORS..... are designed to deliver 32 to 34-deg F water for circulation through air cooling coils in air conditioning systems. The banks may be added to existing systems for increased capacity. Information is available.
Page 147 Item 283

INSULATION ADHESIVES..... provide excellent coverage, high heat resistance, and easier handling of insulation. A free sample and descriptive catalog are available.
Page 147 Item 284

BURNERS FOR GAS OR OIL..... combine low installation and maintenance costs with added years of dependable service. Information is available.
Page 147 Item 285

HIGH PERFORMANCE VENTILATORS are also durable in their bright aluminum housings. One-piece spun inlet is exclusive providing quiet operation at certified capacities. Detailed information and literature available.
Page 148 Item 286

COLUMN SHOWER SPECS AND DATA will show the value of these lower cost units which provide five bathers each with control of water supply and temperature where stall separations are not essential. Catalog available.
Page 149 Item 287

COMBUSTION CHAMBERS..... utilizing the manufacturer's engineered refractories are available in special shapes to meet all individual requirements and specifications. Information is available.
Page 149 Item 288

QUIET SOLENOID VALVES..... used in 475 guest rooms of fabulous Miami Beach hotel to assure quiet, dependable, personalized control of room temperatures. Information available.
Page 149 Item 289

ELECTRIC SPACE HEATERS..... are of proven low cost and dependability. A quick selector catalog gives complete information on the units and their applications.
Page 149 Item 290

CUSTOM MADE AIR DIFFUSERS..... provide unlimited air patterns, suit all job conditions, and blend perfectly with any interior design. They need not be centrally located. Catalog contains complete data.
Page 150 Item 291

POSITIVE SEALING INDICATORS..... proven on thousands of production line installations have one piece extension gasket for positive sealing and fool-proof assembly. Six sizes. Complete line catalog available.
Page 151 Item 292

PRECISION AIR FILTER GAGES..... are built for a lifetime of dependable service, widely used in large buildings, hotels, hospitals, and office buildings. Inclined-tube type, diaphragm-actuated, dial type, and bell-actuated dial type. Bulletin available.
Page 151 Item 293

DRAFT INDUCER LINE..... for low cost heating plant power draft, and industrial exhausting. Up to 20 inches pressure for exhausting corrosive gases, abrasives, and paint spray. Engineering data bulletin offered.
Page 151 Item 294

VENTILATORS AND EXHAUSTERS... present uniform appearances, are of all-aluminum construction and are offered in belt and direct-drive models. AMCA rated. Catalog available.
Page 154 Item 295

LOW-COST HEAT ZONING..... is available with metering valve which provides the comfort of multiple zone heating at a fraction of the former cost. For steam or hot water, they are unconditionally guaranteed. Details available.
Page 154 Item 296

AIR COOLING COIL LINE..... ranges from 2 to 15-ton capacities in 4-row, for residential, and 6-row, for commercial jobs. Units are complete with multi-outlet expansion valves. Bulletin describes complete facilities for fabrication of coils of all types and materials, with prices.
Page 154 Item 297

CENTRIFUGAL ROOF EXHAUSTERS.. enhance the beauty of building skylines with their low silhouette design. Forward or backward curve wheel within or out of scroll housing. Bulletin available.
Page 156 Item 298

LOW-COST, ALL-PURPOSE AIR METER has high and low ranges to give direct velocity readings from 260 to 4000 fpm and static pressure readings from 0.005 to 1.0 inches of water. Comes complete with every accessory for adjusting and balancing air handling equipment. Fits in shirt pocket. Bulletin available.
Page 156 Item 299

NEW STREAMLINED DUCT SILENCERS are designed specifically to reduce the airborne noise generated by fans in industrial ventilating and air conditioning systems. They compare favorably in cost with conventional duct linings. Literature available.
Page 159 Item 300

FANS WITH ALUMINUM BLADES.... combine in one design the advantages of a light weight metal, a hollow structure, and the superior strength of wrought metal. Easily assembled in the tower, fans require no special handling equipment. Details are available.
Page 159 Item 301

PIPE CUTTING AND BEVELING..... expenses are decreased with company's machines which provide complete accuracy with unskilled labor. Out-of-round attachment cuts and bevels out-of-shape pipe with equal precision and accuracy. Full information available.
Page 160 Item 302

DIRECT FIRED HEATERS..... are stainless steel units, 400,000 to 2 million Btu, gas, oil, or dual fuel, for heating factories, warehouses, hangars, etc., which distribute heated air at high velocities direct or through ducts for space or process. New bulletin gives complete specifications.
Page 161 Item 303

NEW FAN COIL UNIT..... is available in a wider selection for simpler installation giving top quality performance at the right price. Split-capacitator motors cut power cost up to 40%. Bulletin gives full details.
Page 162 Item 304

AIR HANDLERS AND CONDITIONERS made by this company are chosen by new Dallas coliseum as they were by New York's Coliseum. Line includes sprayed coil units, giant system fans, ventilating sets. Information available.
Inside Back Cover Item 305

NEW THREE-WAY BY-PASS VALVE.. design simplifies replacement of discs and seat rings. Less than half the usual time is needed to replace disc and seat rings and renew the life of this new unit. Sizes —2½ to 6 inches. Pressures—up to 250 psi at 406 deg F. Bulletins available.
Back Cover Item 306

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U.S.

BUSINESS REPLY CARD

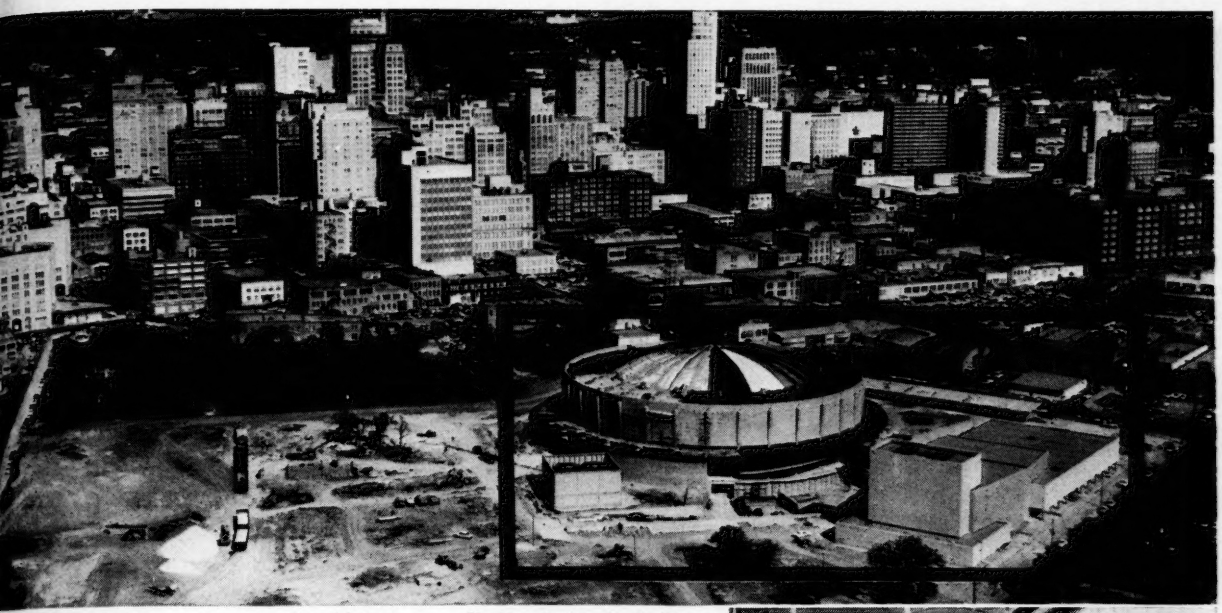
FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING

93 WORTH STREET

NEW YORK 13, N. Y.

AD-DIGEST SERVICE



Architect-Engineer
orge L. Dahl Architects and Engineers
Dallas, Texas

General Contractor
R. P. Farnsworth & Co., Inc.
New Orleans, La.

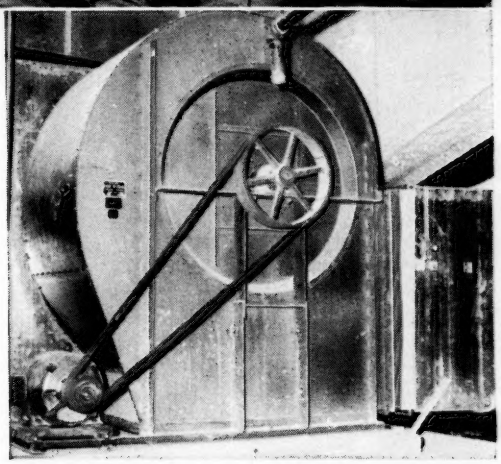
Plumbing, Heating, Air Conditioning
C. Wallace Plumbing Co., Inc.
Dallas, Texas

Another Coliseum Chooses Clarage Air Handling and Conditioning Equipment

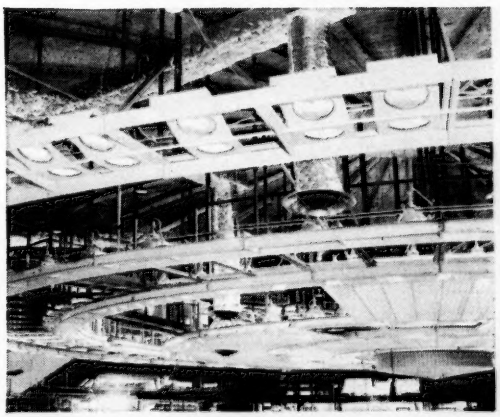
IMPRESSIVE in the Texas tradition is the new Dallas Memorial Auditorium. Its circular arena building, reportedly the largest cement domed structure in the nation, connects with a convention building and lyceum, shown on the right above.

Air handling throughout this vastness was assigned to Clarage equipment — Multitherm conditioning units, Unicoil sprayed coil units, giant system fans, ventilating sets.

Here again, as in New York's new Coliseum and other prominent buildings of all types, Clarage equipment was chosen for its recognized ability to perform quietly, economically, and dependably. CLARAGE FAN COMPANY, Kalamazoo, Mich.



One of several Clarage Type NH fans located in the outer ring which encircles the Coliseum's dome.

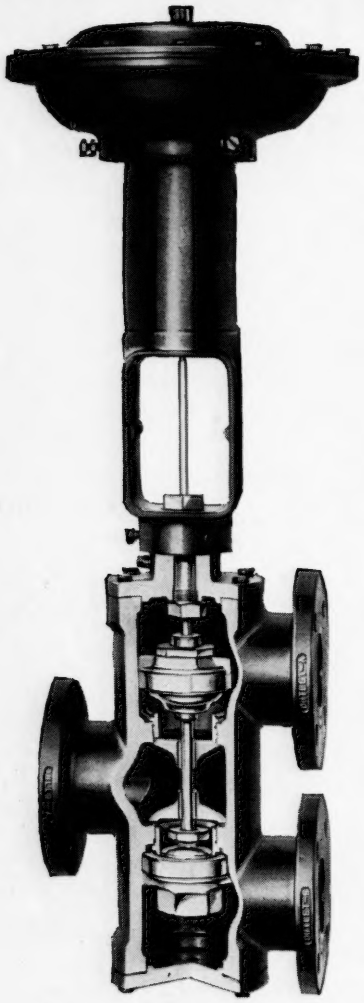


Arrangement of air conditioning ductwork, viewed before completion of the ceiling.

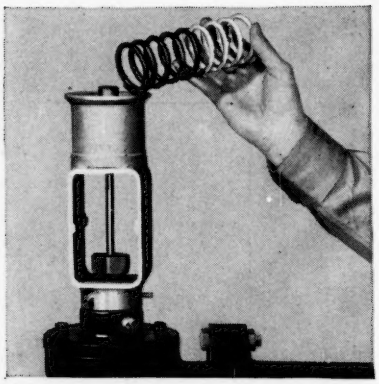
CLARAGE ... *dependable equipment for making air your servant*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

SAVE OVER 50% ON MAINTENANCE TIME!

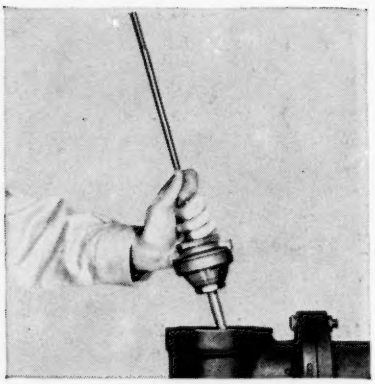


New Design Simplifies Replacement of Discs and Seat Rings

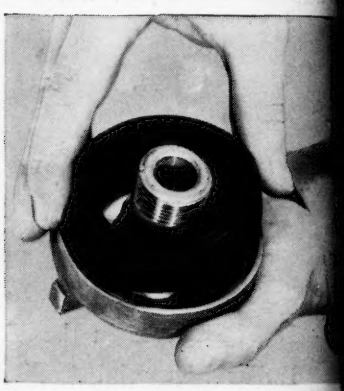


1. While valve remains installed, top and spring assembly are removed.

2. Bottom cap and lower disc holder are moved.



3. Upper disc holder assembly is then lifted out.



4. New seat rings are inserted inside body new discs installed and parts reassembled

THIS NEW THREE-WAY BY-PASS VALVE OUTPERFORMS, OUTSAVES THEM ALL

Less than half the usual time is needed to replace discs and seat rings and renew the life of this new Three-Way By-Pass Valve by Johnson.

Designed for the accurate control of liquid flow, the unique construction of the valve greatly simplifies maintenance and eliminates the need to remove the valve body from the line for servicing. The result is a 50 per cent or greater saving on maintenance time! Even more important in many cases is the reduction in down time and speedy restoration of service.

And that's just one advantage of this exclusive new development for Johnson Pneumatic Control Systems. Compare the other improved features at right with what you are now getting. Mail the coupon for complete details or call your local Johnson branch.

- **100% tight shutoff**—in many diverting applications one valve can now do the job where formerly two were needed. You save the cost and time of installing a second valve.
- **Body design allows simple, straightaway piping**—for faster, easier, less costly installation.
- **Both discs seat against flow**—eliminates slamming and water hammer.
- **Proportional or two position action.**
- **Sizes**—2½ to 6 inches.
- **Pressures**—Up to 250 psi at 406 F.

JOHNSON SERVICE COMPANY
507-B East Michigan St., Milwaukee 1, Wisconsin

Please send me Bulletin Nos. V-210 and V-211 describing your new Three-Way By-Pass Valves.

Name & Title_____

Firm_____

Address_____

City & State_____

JOHNSON CONTROL

PNEUMATIC SYSTEMS

PLANNING • MANUFACTURING • INSTALLING • SINCE 1885